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**Student demographic, academic, and financial characteristics and the likelihood of
on-time credential completion at a rural community college in Iowa**

by

Rachel L. McGuire

A dissertation submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Major: Education (Educational Leadership)

Program of Study Committee:
Lorenzo Baber, Major Professor
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Erin Doran
Larry Ebbers
Jan Friedel
Mike Retallick

The student author, whose presentation of the scholarship herein was approved by the program of study committee, is solely responsible for the content of this dissertation. The Graduate College will ensure this dissertation is globally accessible and will not permit alterations after a degree is conferred.

Iowa State University

Ames, Iowa

2018

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DEDICATION

I dedicate this dissertation to my family; first and foremost, to my husband, Dan. Your support and willingness to let me achieve this is why it is finally done. I cannot tell you how appreciative I am to you for picking up the slack at home while I was gone to class or just studying in the living room. Thank you for allowing me to do it and for making sure the kids never felt like they were missing anything because I was gone or busy doing homework. I loved you before, and I love you even more now.

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To Mom and Dad. Thank you for helping me realize that I am capable of more than I ever imagined possible. Were it not for your support, I would never have enrolled in college after high school graduation; now this will be my fourth and final college graduation. Thank you, and I love you!

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ABSTRACT

This institution-specific credential completion study examined student demographic, academic, and financial characteristics and their relationship to on-time credential completion. Working with institutional data from a medium size rural-serving, public community college in Iowa, a cohort of first-time-in-college students were analyzed for the traditional measurement of on-time completion based on the type of program the student enrolled in their first term. The data was analyzed with descriptive statistics and inferential statistics. The variables found to be significant were underrepresented students, specifically Black and Latinx students when compared to White students, first-generation students, dual enrolled students, math placement level, enrollment status, and EFC category as a measurement of socioeconomic status. The findings will aid in future planning at the institution for policy and practices aimed at improving student retention and thereby greater success for on-time credential completion.

CHAPTER 1. INTRODUCTION

Three out of ten students who start full-time at a community college graduate with an associate degree in three years (National Center for Public Policy and Higher Education, 2011). There is an abundance of literature on the low rates of community college credential completion across the nation (Attewell & Monaghan, 2016; Bailey, Calcagno, Jenkins, Leinbach, & Kienzl, 2006; Bers & Schuetz, 2014; Complete College America, 2011; *The College Completion Challenge Fact Sheet*, 2012a; Gayles & Ampaw, 2014; Klempin, 2014).

Community colleges are the critical access and entry for higher education for many people who need a higher skill set than what a high school education provides (Calcagno, Bailey, Jenkins, Kienzl, & Leinbach, 2008). Nationally, over 65 percent of jobs will require training beyond a high school diploma by 2020 (Carnevale, Anthony, Smith, & Nicole, 2013). Only 40.3 percent of the population of 25–64 year-olds hold an associate degree or higher in the United States (*The College Completion Agenda Progress Report*, 2013). This difference in degree completion and the number of future jobs requiring education beyond high school poses serious implications for the future workforce in communities across the nation. An educated workforce will be essential in years to come for the U.S. to compete in the global economy. State and federal policymakers, educators, and their partners in business and industry all agree that the working-age population will need to gain necessary skills to participate in this changing economy and contribute to society, their communities, and their families' well-being (Morris, 2012).

Workers across the nation suffered tremendous loss in the Great Recession of 2008. The recovery of jobs has been virtually flat for those who do not have any education beyond high school. “Of the 7.2 million jobs lost in the recession, 5.6 million were jobs for workers

with a high school diploma or less. These workers have recovered only one percent of those job losses over the past six years. This group saw no growth among well-paying jobs with benefits” (Carnevale, Jayasundera, & Gulish, 2016, p. 1).

Without a credential or postsecondary education, there are few opportunities for a high school-educated person to live and thrive in middle-class America (Carnevale et al., 2016). A postsecondary credential is one of the best investments individuals can make to ensure their future personal and economic success (Turk, 2017).

College Completion

To address this growing gap in skilled workers, former President Barack Obama challenged America in 2009 to be the world leader in college graduates by 2020 (“The College Completion Challenge Fact Sheet,” 2012b). This set in motion completion initiatives across the nation to increase the number of students who complete a postsecondary credential. The federal government, states, and many educational think tanks are now working together to increase the number of Americans who hold some credential beyond high school. They seek to raise awareness, access, and college completion to better the lives of the people of the United States.

When a student does not complete a credential, more than the loss of potential future earnings is affected. Former Secretary of Education John King said it best when he said: “The most expensive degree remains the one you don’t get” (*Even one semester; Full-time enrollment and Success*, 2017, p. 5). Adults without a credential are often working in low-wage jobs and struggling to make ends meet. The lifetime earnings gap between high school graduates and those who complete an associate degree is growing as industry changes and jobs require some education (“The College Completion Challenge Fact Sheet,” 2012b).

Workers who earn an associate degree make 73 percent more than those who completed high school only (“The College Completion Challenge Fact Sheet,” 2012b).

Offering high-quality credentials to help solve the skills gap is essential for the future of our nation. Community colleges are expected to be the access point for many future workers who need this form of postsecondary education. High-quality credentials can be associate degrees, postsecondary certificates, professional certificates, occupational licenses, apprenticeships, and employee-based training programs (Carnevale, Smith, Gulish, & Hanson, 2015). By achieving the goal set by former President Obama in 2009, it would equate to an additional five million students with advanced training and skills by 2020 (“The College Completion Challenge Fact Sheet,” 2012b).

Future Ready Iowa

On April 3, 2018, Iowa officially launched Future Ready Iowa with the signing of a bill to build the pipeline of Iowa’s talent in the workforce (“American FactFinder,” 2017a) and aid in the shortage of skilled workers. This initiative aims to fill the workforce gap by establishing a strong support system for employers and employees by partnering with schools, colleges, and universities to ensure current and future workers will be adequately trained for immediate employment (*Metrics That Matter*, 2017). The state of Iowa demands workers with expanded skills, and community colleges are a source of training and education for skill enhancement. Future Ready Iowa promotes the reality that postsecondary education and training for Iowans is necessary meeting the state workforce demands and providing Iowans with a living wage.

In 2008, when the recession started, 48 percent of Iowans held either a two- or four-year degree or had a trade certificate or some type of vocational training. By 2016, that percentage had increased to 59. The goal of Future Ready Iowa is for 70 percent of Iowa’s

workforce, ages 25–64, to have some type of education, training, or credentialed skill beyond high school by 2025. Iowa will need an additional 127,000 residents to earn a credential by 2025 to achieve this goal.

With Future Ready Iowa initiatives looking to community colleges to aid in filling this gap, the makeup of community college enrollments must be explored and understood. The population served by community colleges is diverse compared to four-year colleges and universities. At the community college, non-traditional enrollments include older students, part-time students, and students who are juggling full-time work and family obligations (Ma & Baum, 2016). For the community college student who has additional responsibilities, investment in education can be a challenge. Anything that impacts a student's ability to be successful in school is a barrier (Teran, 2007). Rural Iowans have barriers that would probably not be considered barriers in urban areas, such as quality child care to accommodate school and work schedules; reliable transportation for getting to and from work, school, and daycare; and adequate training and education for high-demand jobs. The absence of such amenities may impact the future success of these Iowans ("Future Ready Iowa: Regional Summit," 2018).

Raising a family or taking care of others can be a barrier to completion. One study found that women are more likely than men to enroll part-time. This difference was attributed to female students being the primary caretakers of children (Clery, 2010). Students maintaining many different roles such as spouse, parent, caregiver to an elder, and employee all can be daunting to someone who is trying to fit college into their busy lifestyle.

With busy schedules and working to make ends meet, another barrier is when students are not prepared for the rigor of college courses. Those who are not college ready

and even those who delay enrollment after high school graduation are more likely to place into a developmental math level (Bailey, Jeong, & Cho, 2010). Only one-third of students who are one level below college math actually complete their developmental coursework, and research indicates that students who placed in developmental math were unlikely to obtain an associate degree or transfer (Bailey et al., 2010; Calcagno, Crosta, Bailey, & Jenkins, 2007; Fong, Melguizo, & Prather, 2015). Math requirements become a barrier to completion for many.

If the future benefits of postsecondary education are not understood, and too many barriers delay or get in the way of students' investing in postsecondary education, the United States will continue to see a declining number of educated citizens and a shrinking skilled workforce (Schroeder, 2011). Oreopoulous & Salvances (2011) found that people who do not invest in themselves are less happy, are in poorer health, have less-paying jobs, and experience lower career satisfaction.

This study will explore the relationships between demographic, academic, and financial variables and the likelihood of a student completing on-time. It will investigate these predictor variables of first-time-in-college students starting at North Iowa Area Community College (NIACC) and completing a certificate or diploma program in one year or an associate degree in two years. Utilizing Bean and Metzner's (1985) student attrition model as the basis for analyzing variables, the study will provide an understanding of which predictor variables increase the likelihood of on-time credential completion. Community college leaders can then develop plans to improve or integrate new strategies to increase the completion rates of these students.

Problem Statement

College completion has become a national topic with not only educational leaders but policymakers, philanthropic organizations, and state associations. With dismal completion rates of community college students, a focused look at predictors of completion for a rural-serving Iowa community college will be conducted. While nationally 65 percent of the jobs will require education beyond high school (Carnevale et al., 2016), Iowa is predicting by 2025, over 60 percent of jobs will require some form of postsecondary credential (“Future Ready Iowa Fact Sheet,” 2015). The investment in education will become more important not only to future workers but employers, and the economy will also be impacted if completion rates are not increased.

While access to education has always been the main priority, federal priorities have added credential completion as an important issue for community colleges to focus efforts due to the economic impact. The demands for an educated workforce are rapidly changing the way students, parents, and taxpayers look at the community college not only regarding access but also the success of graduates and the credentials they obtain.

There have been historic changes to the workforce over the century, but the most recent change was the Great Recession, which lasted from December 2007 to June 2009. Unemployment associated with the Great Recession saw the most substantial increase in any recession in 70 years (“The Great Recession,” n.d.). “In 2008 and 2009, the U.S. labor market lost 8.4 million jobs, or 6.1 percent of all payroll employment. This was the most dramatic employment contraction of any recession since the Great Depression. By comparison, in the deep recession that began in 1981, job loss was 3.1, or only about half as severe” (“The Great Recession,” n.d. <http://stateofworkingamerica.org/great-recession/>, para 1).

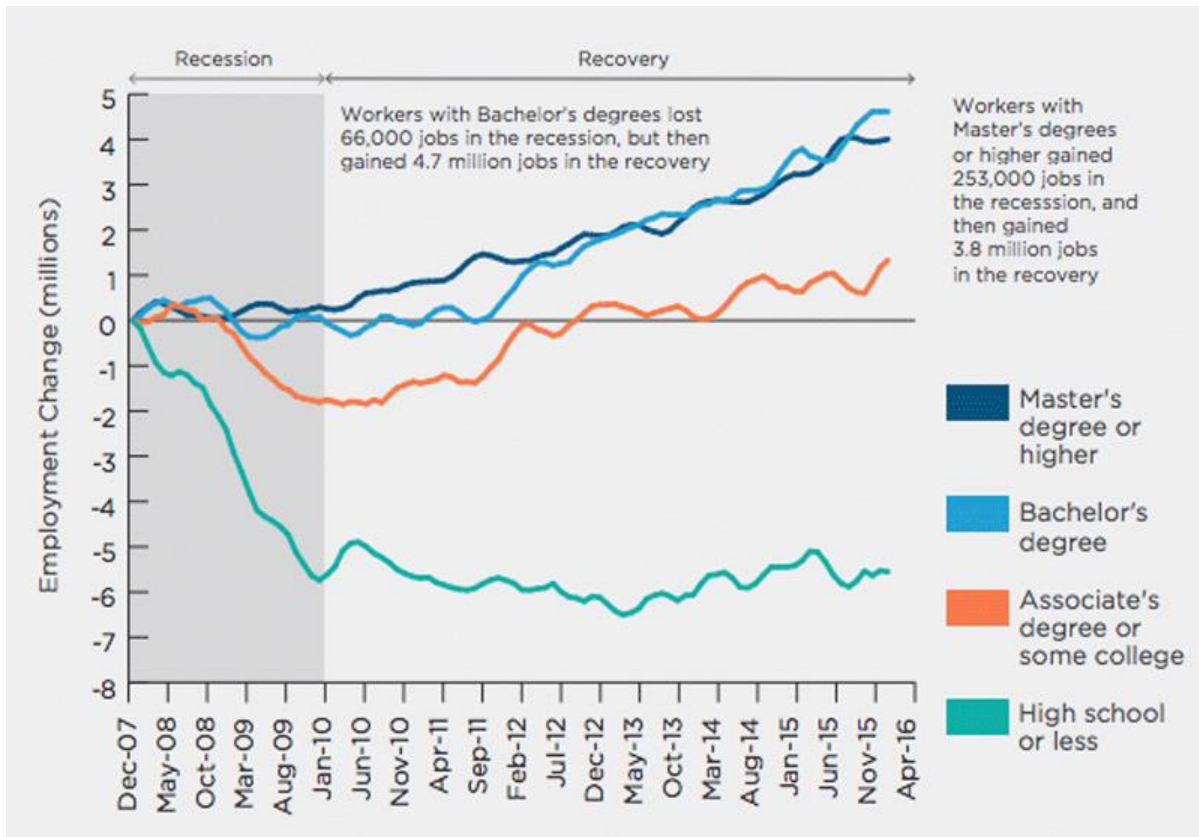


Figure 1. Workers with high school diplomas or less added just 80,000 jobs.

Source: Georgetown University Center on Education and the Workforce analysis of *Current Population Survey* (CPS) data, 2007–2016. *Note:* Employment includes all workers age 18 or older. The monthly employment numbers are seasonally adjusted using the U.S. Census Bureau X–12 procedure and smoothed using a four-month moving average.

Prior recessions have seen a steady recovery which may last two to four years (“The Great Recession,” n.d.). Unfortunately for the Great Recession, the recovery has taken longer, and many families still have not recovered from losing their jobs, health insurance, and their wealth. For workers with only a high school education, the loss has been severe (see Figure 1.). This population has lost the most jobs in the recession and has experienced the slowest growth in recovery (Carnevale et al., 2016). Jobs remain 5.5 million below pre-recession employment levels for workers who have only a high school education.

Educating our workforce after the Great Recession is not only vital for reclaiming the wealth of people and the health of families, but for meeting the growing demand for higher-

skilled employees. Community colleges have always played a key role in local communities for students to take college courses, but they also play an important role in improving the lives of its people and regional economic development (Garza & Eller, 1998). Community colleges offer programs that supply employers with an educated workforce, which, in turn, makes businesses more competitive and productive in a global market (*Analysis of the Economic Impact and Return on Investment of Education; The Economic Value of Iowa's Community Colleges*, 2017).

North Iowa Area Community College

North Iowa Area Community College (NIACC) enrolls approximately 3,000 students each fall semester. During the years analyzed in this project, however, the college experienced record enrollment in 2010 and 2011, and then saw a decrease in enrollment for 2012 and 2013 due to recession recovery. When looking at enrollment trends at NIACC, the enrollment trends directly correlate to the unemployment rate in the region (see Figure 2). Similarly, Iowa community colleges reported that enrollment peaks coincided with the Great Recession, an economic downturn which began in late 2007 (*The Annual Condition of Iowa's Community Colleges*, 2017).

Demographic information for students enrolled in fall 2017 is presented in Table 1. This information reflects the current demographics and may vary slightly from the cohort of students used in this study. The cohort of students used in this study were first-time-in-college students who enrolled for the fall semesters of 2010, 2011, 2012, and 2013. It is also important to note that these enrollment years were just after the recession that ended shortly before the first cohort enrolled.

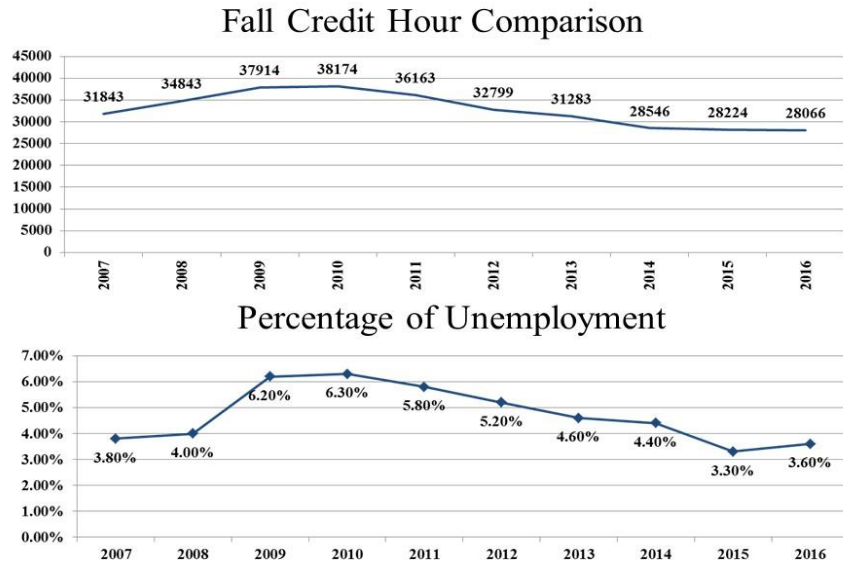


Figure 2. Fall credit hour comparison with annual unemployment percent of NIACC service area.

The geography distribution of the student population in fall 2017 indicated that 82 percent were from the nine-county area that NIACC serves. The counties outside of the service area but still from the state of Iowa brought ten percent of the students, and out-of-state and international students comprised the remaining eight percent of the student body. The market share for high schools in the service area was 30 percent. NIACC experienced a 78 percent market share of students enrolling within five years after graduation (*North Iowa Area Community College Profile*, 2017).

First-generation students at NIACC make up approximately 70 percent of the population. With a federally-funded TRIO program, these first-generation students are afforded additional resources to aid in their college success, but it is not enough for some students who still do not complete. First-time-in-college students for the 2015–2016 academic year at NIACC saw 44 percent of the students needing math remediation. Of the

Table 1.

Demographic Information for Fall 2017 Community College Students

	NIACC	Iowa
Total Enrollment	2,947	90,531
Sex		
Female	55	55
Male	45	45
Age and Enrollment Type		
Average age	20	21
Traditional enrollment	43	31
Non-traditional enrollment	16	30
High school enrollment	41	39
Full-time enrollment	46	38
Part-time enrollment	54	62
Race/Ethnicity		
White	89	78
Latinx	5	8
Black	4	8
Other races/more than one	2	6

Sources: Enrollment trends & analysis. (2017). Mason City; Fall Enrollment Report 2017. (2017). Des Moines, IA. Retrieved from [https://www.educateiowa.gov/sites/files/ed/documents/Fall Enrollment 2017.pdf](https://www.educateiowa.gov/sites/files/ed/documents/Fall%20Enrollment%202017.pdf)

44 percent, 26 percent placed one level below college level, 12 percent placed two levels below college level, and six percent placed three levels below college level (Schmit & Mujica, 2017). Of the new students each fall, approximately 60 percent have graduated in the bottom half of the class, and 50 percent have a cumulative high school grade point average of 2.99 or below (*Enrollment trends & analysis*, 2017).

Dual enrollment, or enrolling in college classes while in high school, is a fairly new metric for this rural Iowa community college. In 1990, NIACC began recording dual enrollments of high school students as its own measure in which 40 students enrolled. That

quickly increased to 181 students in 1995 and currently more than 1,200 high school students earn NIACC credits while attending high school (Wendt, n.d.) These dual enrolled students now account for 41 percent of overall enrollment and produce over 6,000 credit hours.

For some students graduating from high school, figuring out how to finance their education can be difficult. With practices in place to aid in the completion of Free Application for Federal Student Aid (FAFSA) at NIACC, 78 percent of students applied for need-based aid through FAFSA in the 2016–2017 academic year. Of the students who applied, 76 percent received assistance, and 52 percent were awarded a need-based scholarship or grant award in the average amount of \$2,334 (“North Iowa Area Community College—The College Board,” 2018).

NIACC began as a junior college and has been educating students for over 100 years. With more than 40 articulation agreements in place, students find transferring to a bachelor’s degree-granting institution to be a smooth process. Because of this smooth transition, over 70 percent of enrollments at NIACC are in the transfer majors (*North Iowa Area Community College Profile*, 2017). When compared to other Iowa community colleges, NIACC grants more arts and sciences degrees than career and technical education due to this high enrollment of transfer students. (*North Iowa Area Community College Profile*, 2017).

With unemployment levels at 2.9 percent in Iowa, (*Iowa Unemployment Rates by County; January 2018*, 2018), the economy continues to grow from the recent recession with fewer available workers. Employers are looking for a workforce to not only maintain their current level of production and services but also expand it (*Metrics That Matter*, 2017). Companies of all sizes and types look to their local rural community college for help with economic and workforce development needs. This wide variety of needs can be difficult for

a small rural community college because of the lack of resources and economic development activities which tend to be an advantage to large rural institutions (Howley, Chavis, & Kester, 2013).

In addition to recent low unemployment rates, NIACC has been facing severe demographic changes that are shrinking the number of traditional college-age individuals. For example, the Iowa median age is 38.1 years old while NIACC's region has a median age of 43.9 years ("American FactFinder," 2017b). Public school districts have experienced a decrease in total pupil enrollment. School districts in the service region have lost approximately 130 students for the 2016–2017 school year, but the biggest drop was in 2015–2016, when it decreased by 240 students. The largest school district in the service area has watched its enrollments decline more than 1,000 students over a 20-year period ("School district—Certified enrollment | Iowa Department of Education," 2017). As a result, the NIACC service population is aging, and the younger generations are not increasing at the same rate as aging residents.

At this medium size, rural-serving community college, every student and credit counts toward the continued longevity of the college. In these uncertain times of budget shortfalls and cuts, the impact of students not persisting, and ultimately not completing, is severe. This study will aid in enrollment, persistence, retention, and completion practices for NIACC in order to increase credential completion by its students. More importantly, however, it will provide insight into the future success of potential and current students. Once enrolled, retaining students is more cost effective than recruiting new students to replace those who leave (Astin, 1993; Brown, Pascarella, & Terenzini, 1992; Miller & Johnson, 2014; Tinto, 1993).

Discovering which demographic, academic, and financial characteristics are most predictive in the on-time credential completion of current NIACC students and utilizing the findings to enhance student support services and instructional design will aid in the enrollment, persistence, and completion of future NIACC students. This research will help fill the gap in on-time credential completion of students and will aid in national and state college completion agendas.

This study will conduct a quantitative analysis of first-time-in-college students enrolled at North Iowa Area Community College, determining if there are relationships between demographic, academic, and financial variables and on-time completion. Students included in the study were enrolled at NIACC during the fall semesters of 2010, 2011, 2012, and 2013.

The data records of each student were extracted from NIACC's management information system, Colleague, and were provided to the researcher in an Excel® spreadsheet. On-time completion was the dichotomous dependent variable while the independent variables were categorical or continuous. Demographic independent variables included sex, age, race/ethnicity, and parental educational attainment. Academic independent variables were dual enrollment credits earned, math placement level, housing arrangement and enrollment status of the first term of enrollment. Financial independent variables included a student's Estimated Family Contribution (EFC), the FAFSA application status, and dependency status. Both descriptive and inferential statistics were used to describe, summarize, and analyze the information collected for this research.

Research Questions

The following questions were used to frame the study of rural-serving Iowa community college students and guide the researcher in the collection and analysis of data:

1. What are the demographic, academic, and financial characteristics of students who enrolled during the fall semesters of 2010 through 2013 at a rural-serving medium size Iowa community college?
2. What are the potential relationships between demographic characteristics and the likelihood of on-time completion?
3. What are the potential relationships between academic characteristics and the likelihood of on-time completion?
4. What are the potential relationships between financial characteristics and the likelihood of on-time completion?
5. If demographic, academic, and financial characteristics do predict on-time completion, do the results differ for students who completed the FAFSA and any required verification processes versus a student who did not complete the FAFSA and required verification?

Limitations

The limitations of this study were that the students analyzed were from one institution. Most of the information collected was self-reported by the student at the time of admission through the application and could have changed throughout their enrollment. Financial variables were obtained from the FAFSA.

Students represented in this study were from four cohorts of FTIC students enrolled at NIACC and were collected shortly after the 2008 Great Recession, which could have impacted some of the variables. While variables in this study were selected based on previous empirical research, they may not have provided the full picture of why some students completed a credential on-time and others did not.

This dissertation will contain five chapters. The first chapter will provide an introduction and overview of the research topic. The second chapter will provide a review of literature that focuses on demographic, academic, and financial characteristics and their relationship to persistence and, specifically, on-time completion. The third chapter will focus on the methodology and methods used for this study. The fourth chapter will provide an analysis of the data collected, and the fifth chapter will conclude with a discussion of the findings, implications for practice, and recommendations for further research.

Definition of Terms

The following definitions are provided to facilitate the appropriate understanding of certain words and phrases used within the construct of the study:

Career Technical Education (CTE): Provides students of all ages with the academic and technical skills, knowledge, and training necessary to succeed in future careers and to become lifelong learners.

Credential Completion: Completing a certificate or diploma program in a one-year time span (fall, spring, and summer terms) or an associate degree in a two-year time span (fall, spring, and summer terms in two consecutive years).

Community College (CC): A two-year, public, not-for-profit, higher education institution with regional accreditation that most commonly awards certificates, diplomas, and associate degrees to students.

Continuing-Generation Student: Continuing-generation college students are enrolled in postsecondary education, and both parents have a bachelor's degree.

Delayed Enrollment: A student who delays college enrollment immediately following high school graduation.

Developmental Math: Often referred to as a remedial course, a developmental course intends to raise the student's math skills. These math courses cannot be counted towards college transfer credit. This term is used interchangeably with remedial math.

Estimated Family Contribution (EFC): The amount of money the family is expected to contribute to the student's education as determined by the federal methodology needs analysis formula.

Free Application for Federal Student Aid (FAFSA): The application for federal student aid. Completing the FAFSA is free and gives access to the largest source of financial assistance from federal, state, and institutional support. The information provided on the FAFSA is used to calculate the EFC.

First-Generation Student: First-generation college students are identified as students whose mother and father have not obtained a bachelor's degree or higher. When a student identifies only one parent on the application for admission and the educational background, the student will be classified as missing information for this variable.

General Education Diploma (GED): General Equivalency Diploma is a series of tests that, if passed, provide certification that the test taker has achieved United States high school-level academic skills.

Math Placement Levels: The math level at which a student is placed through the use of the American College Testing (ACT) Math test, Scholastic Aptitude Test (SAT) math test, or the COMPASS Math assessment score.

College-level Math: Placement in Math for Liberal Arts, College Algebra, or any higher-level math course associated with a high placement score.

1 Level below: Placement in Intermediate Algebra.

2 Levels below: Placement in Beginning Algebra.

3 Levels below: Placement in Pre-Algebra, Survey of Math, or Applied Math

Normal Time to Completion: Normal time to completion is the same measurement as on-time completion. It is defined as completing programs within 100 percent of normal time to completion. However, in some studies, researchers use additional time to completion such as 150 percent of normal time to completion, i.e. a degree program would allow three years to graduate instead of normal time of two years.

On-Time Completion: Measured as one year to complete a certificate or diploma program and two academic years to complete an associate degree.

Rural-serving community college: Rural-serving community colleges, as defined by the Carnegie Classifications, are community colleges that are not physically located in areas with large populations defined as Primary Metropolitan Statistical Areas (PMSAs) or Metropolitan Statistical Areas (MSAs) which have populations that exceed 500,000 people.

Rural-serving medium size college: In addition to classifying colleges by regional population, the Carnegie Classifications system codes colleges by unduplicated headcount in which the college is this study is considered a rural-serving medium college with enrollment between 2,500 and 7,500 students. A rural-serving small college is one with unduplicated headcount below 2,500 students and a rural-serving large college have an unduplicated headcount enrollment above 7,500 students.

Sex: In this study, sex is considered the biological concept based on biological characteristics.

Underrepresented Population: Underrepresented populations in the context of this paper will be any race other than White.

Verification: A process in which the college collects documentation to determine if information a student submits on the FAFSA is correct. The U.S. Department of Education and the colleges receiving the FAFSA can flag students for verification.

Summary

Community colleges are an essential part of the educational system of America. Mission statements of community colleges are vast, but one consistent theme is the accessibility of education to all. While this is one of the reasons why community colleges are a vital part of the educational system, it also comes with challenges. The flexibility and easy access can be detrimental to students enrolling and completing. The impact of not achieving a credential affects not only individual students but their families' well-being, the communities the students reside in, and the businesses who need skilled workers to keep their communities prosperous and thriving.

CHAPTER 2. LITERATURE REVIEW

The purpose of this quantitative study was to examine the relationships between demographic, academic, and financial characteristics and on-time completion at a small, rural community college in Iowa. On-time completion for this study will be defined as the completion of coursework in one year for certificate and diploma programs and two years for an associate degree. This chapter will provide a review of literature for Iowa community colleges, rural citizens of Iowa, and on-time completion. Guided by the theoretical frameworks provided by Tinto (1993) and Bean & Metzner (1985), a review of the independent variables selected for this study will also be included in this chapter.

Scope of the Literature Review

Articles were identified with a search of EBSCO host and Google Scholar using combinations of keywords (community college student, two-year student, degree completion, on-time completion, normal time completion, persistence, retention, barriers, quantitative and logistic regression), resulting in the location of thousands of studies published since 2000. Some results were from prior to 2000, and if they were cited often or downloaded more than 50 times, the study was reviewed for pertinent information for this research study. Reference lists of relevant books, articles, reports, conference proceedings, and dissertation abstracts were reviewed. Google search engine was also utilized to acquire web pages related to the key terms identified.

Iowa Community Colleges

Iowa's first junior colleges were established in the early 1900s (Friedel, Salinas, & Thornton, 2015). These colleges were built from the local school districts and, after approval from voters in 1927, began as part of Iowa's public school system. While over 30 junior

colleges opened their doors to higher education, only 16 were still in operation in 1965, along with four postsecondary vocational-technical schools (“IACCT,” 2014). The legislature, under Governor Harold Hughes, passed a law in 1965 which created Iowa’s community colleges, and fifteen districts were formed. Several years went by before the final [and still current] boundaries of each community college region were drawn (Friedel et al., 2015). The mission of all Iowa community colleges was similar, and these colleges began offering a wide variety of programs and services to meet the needs of its people.

As established in 1965, a locally elected board of directors governs each Iowa community college. The make-up of the elected board, staff, faculty, and students are as diverse as the community colleges across the state. Of the 15 Iowa community colleges, five are located in larger cities with the remaining ten situated in smaller towns and rural communities with fewer than 33,000 residents (“Iowa Cities by Population,” 2018). In many cases, the expectation of the constituents who reside in these communities is that the local community college is the pipeline to an educated and skilled workforce, and the community college is to respond immediately to its needs (“Community Colleges - Iowa Department of Education,” n.d.).

“The overarching shared value of the state’s community colleges is the right of all Iowans to achieve their full potential through education. The area schools adhered to this value by expanding access and opportunity to higher education to all citizens within their region and beyond. With relatively low cost, open admissions policies, new offerings for diverse groups, and located within a one-hour drive of nearly all Iowans, the community colleges popularized and democratized postsecondary education in the state” (Friedel et al., p. 4).

The enrollment at Iowa community colleges has grown since the 1960s and continues to meet the needs of Iowans. In fall of 2017, over 90,000 students enrolled at one of the 15 Iowa community colleges, making up 37 percent of the college and university enrollments in the state (*Fall Enrollment Report 2017*, 2017). In 2010, the state experienced the highest enrollment in the 50-year history of community colleges with over 100,000 students enrolled (*Fall Enrollment Report 2017*, 2017). It is important to note that NIACC has a rich history of providing education to the people in its region. Prior to 1966, the college was known as Mason City Junior College and was established in 1918.

Iowa community colleges offer credit programs in two areas of instruction: career and technical education (CTE) and college parallel (transfer) programs that allow a student to transfer to a four-year bachelor's degree-granting institution (Condition of Community Colleges—Iowa Department of Education, 2018). CTE programs are designed to educate a student in a specialized, skilled trade, applied sciences, modern technology, and career preparation. These programs award associate degrees, diplomas, and certificates to eligible students. The college parallel (transfer) programs are for students who want to earn an Associate of Arts (AA) degree with the intent of transferring to a four-year college after completing their general education requirements at the community college. Both of these credit programs—CTE and transfer programs—are accounted for in the graduation rates of community colleges. When comparing public, four-year college graduation rates with graduation rates of Iowa community colleges, community colleges are lower at 26 percent. Moreover, less than half of those who do graduate do so in two years (“Graduation from Iowa Colleges and Universities: Iowa College Student Aid Commission,” 2018).

Community colleges serve a more diverse population compared to four-year colleges and universities (Clotfelter, Ladd, Muschkin, & Vigdor, 2013; Davidson, 2014; Scott, Miller, & Morris, 2015). With more types of offerings and easy access to enroll, community colleges, with their open door policy for admissions and flexibility of course schedules, see larger numbers of non-traditional enrollments such as older students, students who enroll part-time, and students who are juggling demands of work, family, and school (Davidson & Wilson, 2017; Taniguchi & Kaufman, 2005). Work, families, and other obligations are common for the majority of community college students.

Rural Iowa Citizens

While every citizen of Iowa resides in a district of an Iowa community college, the ability to get to the college may present a challenge. Time, transportation, and technology can all be barriers for a rural resident to obtain a college credential (Baum, Ma, & Payea, 2013; Calcagno et al., 2008; Engle & Tinto, 2008). For some residents, the local community college can be a 60-mile or one hour's drive to campus (Friedel et al., 2015). That adds up to lost time and transportation costs, especially when many have other obligations as mentioned above.

Although all Iowa community colleges offer online coursework, rural students may have issues with high-speed internet and technology. For example, approximately one in five Iowans do not have access to the broadband internet speeds recommended by the federal government (Murphy, 2017). Further, 12 Iowa counties had fewer than 40 percent of its residents with access to mid-range broadband internet, not high speed. Of those 12 counties, ten were considered low-population areas or, more specifically, the least populated regions in rural Iowa (Murphy, 2017).

Rural students want to be educated and to better their lives but have entirely different barriers than urban students. Issues with food, transportation, housing, healthcare, childcare, and lack of access to broadband internet are topics of primary concern (Smith, 2017).

“Poverty in rural communities just looks different from poverty in urban areas. Trying to have a discussion about the importance of attending class falls to the back burner if a student is in survival mode” (Smith, 2017, para 3). The increased burden of barely getting by is a reality for many low-income rural students trying to better their lives through education.

While social services are available to any American, support of these social services is higher in urban areas just by the sheer number of people and more wealth (Smith, 2017). Rural counties tend to have fewer people, and social services are sometimes miles away, so people who could benefit from these social services are not familiar with them (Smith, 2017). Plus, rural food pantries and other social services require transportation to and from that may only be a public transportation ride away for someone in an urban area. Rural Americans face challenges just like any other American, but rural people are more hidden from mainstream media and in some cases too prideful to seek the resources needed to better their situation.

Some small rural communities are thriving despite the demographic changes and social conditions of the area. The ones that are thriving tend to be a cornerstone to an industry such as agriculture, construction, mining, manufacturing, and meat processing (Koricich, Chen, & Hughes, 2018). Despite the large geographic area that rural community colleges serve, they become the lifeline to these small communities and the residents that reside there. “In areas with limited cultural, social and recreational services, rural community colleges may be the only source of cultural avocation and personal enrichment in the region” (Pennington, Williams, & Karvonen, 2006, p. 642).

The Cost of Education

Cost is a significant factor in postsecondary education. The average tuition and fees cost to attend an Iowa community college for one year is approximately \$5,190 (*Tuition and Fees Report*, 2017). With the median household income for Iowa being \$56,247 in 2016 (“Iowa Quick Facts—State Data Center,” 2017), the educational cost of tuition is almost ten percent of the household income; this estimate is not including books or other necessary expenses of attending college. For Iowa community college students in the 2014–2015 academic year, they missed out on \$633.4 million in money that they would have earned if they had been earning instead of learning (*Analysis of the Economic Impact and Return on Investment of Education; The Economic Value of Iowa’s Community Colleges*, 2017).

When deciding whether or not to pursue postsecondary education, the loss of potential income and time can be significant. Research has found that community college students are more sensitive to increases in tuition and decreases in financial aid than their four-year peers (Attewell, Heil, & Reisel, 2012; Denning, 2014; Heller, 1997; Tinto, 1993). Partly due to the diverse populations that community colleges serve, community college students tend to have many roles that they fill in a family and their communities (Scott et al., 2015). Working full-time, taking care of children or finding childcare while in classes, and taking care of elderly parents and neighbors can all deplete the time a person might have invested in themselves and their education.

While all Iowa colleges have experienced increases in tuition and fees for quite some time, community colleges have increased substantially in tuition and fees over the past decade. The average tuition costs for the fiscal year 2017 was up 4.6 percent from the

previous year, and mandatory fees increased by 4.4 percent. The average tuition at community colleges over the past decade has increased by 32 percent (“Trends in College Pricing,” 2018).

Despite the cost factor to the individual seeking an education, Long (2010) finds that postsecondary education plays a significant role in the economy and not just for the individual. Iowa community college graduates can expect to earn approximately \$10,000 per year more than a high school graduate (*Analysis of the Economic Impact and Return on Investment of Education; The Economic Value of Iowa’s Community Colleges*, 2017). Education not only benefits higher earnings, but it also provides greater future opportunity and prosperity along with better health decisions. Steinberg, Piranino & Haveman (2009) found that a postsecondary degree decreases crime and unemployment, and it increases the tax base, civic engagement, and charitable giving. Citizens educated beyond high school are part of a healthier and more productive society. Despite these positive impacts that education can have on a person, many barriers still exist for community college students and their successful completion of a credential.

Conceptual Framework

One cannot review persistence and completion research studies without very quickly finding the research of Vincent Tinto and his theory of departure. Tinto (1993) theorized that academic and social integration are keys to student success, and the commitment of building a strong sense of pride and connectedness to the institution and the social community on campus is important. The interactions a student has with peers and faculty at the institution are essential for the student to stay enrolled. If these relationships are not meaningful to the student, the likelihood of persisting to completion decreases.

This model is criticized for being more appropriate for four-year residential colleges and universities than community colleges. Community colleges enroll a more ethnically diverse group of students, more first-generation students, and more low-income students than their four-year peers (Bean & Metzner, 1985; Coleman, 1988; Deil-Amen, 2011; Rendón, Jaloma, & Nora, 2000). College integration comes more naturally at four-year colleges, where students live in on-campus housing and spend long days of orientation prior to the start of the term; not so for non-traditional students who attend community colleges. Many community college students have very different college experiences than their four-year college peers (Cox & Ebbers, 2010).

With the diverse nature of community colleges in mind, Bean and Metzner (1985) developed a non-traditional student attrition model that emphasizes environmental factors of student success and considers things that are part of a student's everyday life over which the institution has no control. Bean and Metzner (1985) found that it was hard to distinguish between traditional and non-traditional students. Non-traditional students tend to be older, live off-campus, and enroll part-time. Often they are low income and racially considered a minority (Wood & Williams, 2013). This model has been more successful with the adult student population and commuter students who enroll in community colleges every year because of the environmental factors that detract students from being successful in college (Davidson & Petrosko, 2015; Summers, 2003; Wood & Williams, 2013). These students may not change their social environment like a traditional college-aged student who lives on campus would. Tinto himself agreed that in the new version of his model that background characteristics and external circumstances have a more significant impact on persistence than on-campus factors for community college students who commute (Tinto, 1993).

Academic and environmental factors, rather than social integration, were emphasized in Bean and Metzner's (1985) student attrition model. It addressed the non-traditional type of students who enroll at community colleges and considered the external environmental factors they must overcome if they are to complete a credential. They postulate that for non-traditional students, environmental factors rather than academic variables have a more significant impact on the decision to stay enrolled or to drop out (Bean & Metzner, 1985). Classroom experiences and activities are valuable but not as important as they are to traditional students who leave their external environment to integrate into the college atmosphere by becoming socially connected to the college.

A review of the literature on Bean and Metzner's (1985) student attrition model found several community college studies in the past ten years. It has previously been utilized as a model to investigate persistence and retention related to demographic, academic, and environmental factors and has been validated on non-traditional student populations in community colleges including Black men (Wood & Palmer, 2016; Wood & Williams, 2013); adult students in rural-serving community colleges in North Carolina (Howley et al., 2013); part-time, female, adult students in the Midwest (Cox & Ebberts, 2010); first-generation students from the Appalachian region (Hand & Payne, 2008); and developmental math students in Kentucky's community and technical colleges (Davidson & Petrosko, 2015).

While some of these studies utilized small, rural community colleges, others were larger colleges, and even national data sets were used. The purpose of this study was to extend previous research by utilizing demographic, academic, and financial characteristics within the context of a rural Iowa community college to identify predictors of on-time completion.

Independent Variables

Bean and Metzner's (1985) model guided the selection of the independent variables in this study. The variables in the model were organized into three categories based on the major constructs of the model: demographic, academic, and financial characteristics of students. Table 3 summarizes the coding of each independent variable.

Student Demographics

Sex¹

There is a wide array of literature on the biological sex of students and completion. The research mostly concludes that females enroll in college and complete at higher rates than males (Buchmann & DiPrete, 2006; Conger & Long, 2010; Lopez, 2009; Turk, 2017). Females make up the most significant portion of enrollment in all sectors of higher education, including community colleges (St. Rose & Hill, 2013). In 2017, 56 percent of enrollees were females (*Fast Facts - AACC*, 2017). However, females have not always been the sex to most likely to enroll.

As females experienced societal changes and gender roles began to change, their behaviors and decisions regarding college enrollment changed, and more females enrolled in college. Major changes in female enrollment have been seen in the last several decades (Flashman, 2013). Lopez (2014) reported that in 1994, 63 percent of female high school graduates and 61 percent of male high school graduates enrolled in college immediately following graduation. In 2012, 71 percent of female high school graduates enrolled in college while males remained at 61 percent. As women have increased their college

¹ In this study, sex is considered a biological concept. Because previous research has used the word gender and sex as their variables of study, gender and sex will be used as it was presented in the research reviewed.

attendance rate over the past eighteen years, the rate has remained constant for men attending college during the same time period (Lopez, 2014).

In addition to enrolling at higher levels, females are also graduating at a higher rate than males (Conger & Long, 2010; Corbett, Hill, & St. Rose, 2008). This is the case in all major race and ethnic groups (Pollard, 2011). Women have maintained a steady rate of completion across time (Flashman, 2013; Hagedorn, 2005; St. Rose & Hill, 2013), as much as 20 percent higher than their male peers (Hagedorn, 2005).

Age at College Enrollment

Students who delay entry to college following high school graduation can be creating a hardship on their future college enrollment (Craig & Ward, 2008). Many older students are apt to have poor study habits due to higher-priority family obligations. Many have lost content knowledge, making courses more difficult or precipitating additional coursework to get to college level. Due to these obstacles, graduation rates of adult learners are low nationwide (Choy & Phillips, 2002).

According to Shapiro et al. (2016), age matters when it comes to the amount of time it takes to complete a degree. Students who earned an associate degree and enrolled for the first time younger than 20 years old, took 5.1 years to complete a degree. For students who were over 20 years old, it took 6.9 years to complete an associate degree. Stratton, O'Toole, & Wetzel (2006) concluded that older individuals are less likely to enroll full-time, and that adds time to completion. Students who have multiple roles in a family are less likely to complete a degree (Petty, 2014).

Previous research has found that any delay of enrollment after high school can impact college completion, but Taniguchi & Kaufman, (2005) found that the more years there are between high school graduation and college enrollment, the more a student's aspirations to

complete are affected because of perceived benefits. Older students may realize they have fewer years to benefit from a credential and their expected payoff may not exceed the cost of putting in the time, money, and effort to complete the credential (Taniguchi & Kaufman, 2005).

Underrepresented Students²

College completion rates vary greatly between races and ethnicities. Much of the research finds that White students enroll and complete at higher levels than most minorities but especially with Latinx and Black students (Perna, 2007). With approximately half of all students enrolled in community colleges identifying as White, Latinx students make up 23 percent of the total community college enrollment and Black students, 13 percent (*Fast Facts*—AACC, 2017). Minority students are more likely to not perform at the same levels as their White peers and also leave college without completing a credential (Calcagno et al., 2007; Greene, Marti, McClenney, & Kay McClenney, 2008; Strayhorn & Johnson, 2014; Wood, 2012).

The completion rate for White students at community colleges across the United States was the highest, at 45 percent, followed by Asian students, with 44 percent. Latinx and Black students lagged, with 33 percent and 26 percent completion, respectively (Shapiro et al., 2017). Looking specifically at Black males and Latinos, Mangan (2014) found that they had higher aspirations for college than their White peers. However, when it came to completion, White men were six times more likely to graduate within three years.

Minorities in Iowa are similar to the national statistics on completion. Slightly higher than national figures, approximately half of Black Iowans have some postsecondary

² Underrepresented populations in context of this paper will be any race other than White.

education while just over one-third of Latinxs do (*The 2016 Condition of Higher Education in Iowa*, 2016). With the number of minority students in the state's educational system is growing, filling that gap between aspirations and completion for Blacks and Latinxs is essential to increase the completion rate of Iowans (*The 2016 Condition of Higher Education in Iowa*, 2016).

First-Generation Students

First-generation college students (FGCS) can be defined in different ways (Byrd & MacDonald, 2005; Nuñez, Cuccaro-Alamin, & Carroll, 1998). For this study, a first-generation student will be identified as a student whose mother and father have not obtained a bachelor's degree or higher. When a student identifies only one parent's educational background, the student will be classified as missing information for this variable.

Despite the differing definitions, research has found that first-generation students struggle to navigate the college system, are less exposed to college culture, struggle to afford college, and are less academically prepared for college (Atherton, 2014; Byrd & MacDonald, 2005; Choy & Phillips, 2002). Engle and Tinto (2008) state that many first-generation college students come from low-income families because their parents do not have a postsecondary education, which limits them in well-paying jobs and careers. When first-generation students come from low-income families, they may have other responsibilities that include working to help make ends meet within the family. Having multiple roles in a family is a barrier that decreases the likelihood of completion (Petty, 2014).

Continuing-generation students who do have parents who have earned a bachelor's degree or higher have different expectations for their academic and college attainment. When parents have obtained a college education, they both talk more about college and have higher expectations for their children's education beyond high school (Davis-Kean, 2005).

These parents enroll their children in summer reading programs, camps, and lessons beyond the school day that in turn provide expectations about lifelong learning for their children (Alexander, Entwisle, & Bedinger, 1994; Davis-Kean, 2005). In a recent report by the Institute of Educational Sciences, 54 percent of first-generation students left college without a degree versus 45 percent who were not considered first-generation students (Redford, Mulvaney Hoyer, & Ralph, 2017).

Academic Characteristics

Enrollment Status

The accessibility and flexibility that community colleges offer with enrollment can be detrimental to the student's completion. While many students enjoy the flexibility of enrolling part-time, the number of semester hours a student enrolls for in the first term does impact the likelihood of retention (Fike & Fike, 2008). A student who enrolls part-time is more likely to stop out for a semester or two, decreasing the chances of completion even further. In a large study of part-time students enrolled in community colleges, 47 percent believed they would graduate in one to two years, when in fact only eight percent of part-time students actually do (*Even one semester; Full-time enrollment and Success*, 2017; *Reframing the Question of Equity: Understanding the Growing Importance of Success for Community Colleges' Part-time Students*, 2018). This is a factor in completion across all credential and degree types.

Students who enroll even one semester full-time have a higher chance of completing their credential (*Even one semester; Full-time enrollment and Success*, 2017). In a similar study analyzing course-taking patterns over six years, Driscoll (2007) found a strong correlation between first-term enrollment and the likelihood of returning for the spring semester as well as transferring and degree earning. By enrolling in more credits each

semester, a student saves time and pays less. The number of years of potential earnings also increases. (*The Power of 15 Credits: Enrollment Intensity and Postsecondary Student Achievement*, 2013).

Over 75 percent of students enrolled in college are managing some combination of family, work, and school (Morris, 2012). Enrolling full-time rather than completing a few credits each semester helps students make headway in the number of credits required to graduate on-time despite the other obligations they face.

Dual Enrollment³

Dual enrollment allows high school students to enroll in college courses. While the ability to earn college credits has been around for decades for high-achieving students, only in recent decades has the ability to earn a career and technical education become another option for students who may not have the desire to earn a bachelor's degree (James, Lefkowitz, & Hoffman, 2017).

With both high-achieving college coursework being offered and career and technical education now available, dual enrollment has increased tremendously across the United States (Thomas, Marken, Gray, Westat, & Ralph, 2013). In Iowa, dual enrollment has increased by 137 percent over the past 13 years (*The Annual Condition of Iowa's Community Colleges*, 2017). Dual enrollment can benefit students in rural areas that tend to report lower levels of college attainment than urban areas (Zinth, 2014).

Credential completion within a specific timeframe is heavily analyzed but not usually for community colleges. A minimal number of studies measure on-time completion at community colleges for dual-enrolled students. Struhl and Vargas (2012) found that dual-

³Dual enrollment in context of this study will be identified as any high school senior enrolling in a college course offered at this institution to earn dual credit.

enrolled students were 1.83 times more likely to finish an associate degree in three years when they complete more than one course of college credit while in high school, and at least one course is a math course. Other studies have used longer time frames for completion, anywhere from three to eight years, which is not considered timely for an associate degree (Grubb, Scott, & Good, 2017).

Math Placement Level⁴

Developmental education gives students with low academic skills an opportunity to prepare themselves for college-level work. Some students may be just below the college level and with refresher work can move to college level quite quickly. Others, however, may be required to enroll in two or three levels of developmental education coursework before being deemed college ready. Approximately 60 percent of first-time-in-college students are required to take developmental math coursework (Bahr, 2013; Bailey et al., 2010; Park, Woods, Hu, Jones, & Tandberg, 2018; Wang, Wang, Wickersham, Sun, & Chan, 2017). The level of academic preparation for college is a significant predictor of the success of the student (Adelman, 2006).

While it may seem that any additional coursework would benefit students' academic abilities, developmental education research has produced mixed findings. Fike & Fike (2008) found there is greater success when a student enrolls in developmental coursework immediately upon college enrollment. However, in contrast, there are also findings that it is a hindrance to student success and eventual completion (Calcagno et al., 2007; Fong et al., 2015; Grimes & David, 1999). Nearly three-fourths of students who enroll in a math remediation class do not complete it (Bahr, 2013).

⁴ Developmental education is the term that will be used for this study. Other terms for developmental education are remediation or remedial coursework.

Developmental coursework not only comes at a cost for institutions having to provide additional student services, but it also costs students. Students must spend extra tuition and fees to complete developmental coursework, spend more time in college, graduate later, and lose out on potential earnings by being enrolled longer (Bailey, Jeong, Cho, & Bailey, 2008).

It is important to note that not all institutions will utilize the same assessments for placement. As Baber, Castro, and Bragg (2010) advise assessment tests and scores used for placement can be substantially different from one institution to another. The institutional assessment scores and course placement can be found in Table 2. During the timeframe of this study, the COMPASS assessment, ACT math, and SAT math scores were the assessments that placed students in the appropriate math courses (Pre-Algebra, Beginning Algebra, Intermediate Algebra, College Algebra) at the institution. While Iowa does not have a standardized placement assessment, many of the community colleges did use the same assessments to place their students; however, cut-off scores varied slightly.

Housing Arrangement

Community college housing can provide a student with a convenient living option and savings on travel and living expenses. Students who most frequently reside on campus are traditional college-age males, ages 18–24, who attend college full-time (*Fast Facts - AACC*, 2017).

For college students who live on campus, research has shown positive results in persistence and completion (Pascarella & Terenzini, 2005). However, most of the work of Pascarella and Terenzini was conducted with four-year college students. The research implies that it would translate to the community college student, but little research has been done specifically on on-time completion within this population (Moeck, Hardy, & Katsinas, 2007; Moeck, Katsinas, Hardy, & Bush, 2008).

The institution in this study has a long history of having on-campus housing available to students. Several years ago, this institution tore down its 35-year-old dormitories and invested 24 million dollars in new suite-style living with 396 beds. The new facility has all the amenities of modern-day living for students. However, for the cohort of students in this study, the old-style dormitory was in place, and it did not have the amenities available to students today. Many students were within driving distance for a weekend trip home and did that often. Conducting this study and comparing the results with studies on students who reside in the newer student housing is of interest to the researcher and this institution for future planning of activities and events for housing students.

Financial Characteristics

FAFSA and the EFC

Financial aid can help bridge the gap between the cost of earning a degree and available resources. However, students have to begin the process of receiving financial assistance by completing the Free Application for Federal Student Aid (FAFSA). The FAFSA attempts to provide a college with a snapshot of how much need a family has and then distributes the funding available. It collects much information on students, and their families too if the student is deemed a dependent, in hopes of providing the neediest of families aid to attend college.

The FAFSA is the gateway to many different resources to help pay for college. A student must complete the FAFSA to receive any federal, state, and many times institutional money. Over 9.5 billion dollars were not used by those who would have been eligible for financial resources to help pay for college (Kantrowitz, 2009a). In his *“Analysis of Why Some Students Do Not Apply for Financial Aid,”* Kantrowitz found that the typical student who does not submit the FAFSA but would qualify is an independent male student, possibly

married but without children, at least 24 years old, and attending a two-year college part-time. About a quarter of these “typical students” come from low-income households.

Students who fail to complete the FAFSA have a harder time managing school with other life demands and commitments outside of school (Kantrowitz, 2009b; McKinney & Roberts, 2012; Novak & McKinney, 2011).

For the study, the researcher will use EFC as the variable to determine the socioeconomic status (SES) for students. According to Davidson (2015), EFC is a more accurate way of measuring economic status on completion. While many research studies use Pell Grant awards as a way to indicate the socioeconomic status of students, he concludes that there are too many factors that determine the Pell Grant award, and the EFC is a better way to know what the family economic status truly is.

Dependency Status

Dependency status is based on a student and parent’s financial ability to pay for the expenses related to college enrollment. Dependent students are required to provide their parents’ tax and financial information in addition to the student’s tax and financial information to determine the family’s financial ability to pay. An independent student is one who does not include any parent information to determine financial ability, but if a student is married, the spouse’s information will be included in the analysis.

Independent student status appears to be growing with over half of all U.S. college students being deemed independent according to the FAFSA standards (Reichlin Cruse, Eckerson, & Gault, 2018). Of the independent students, 55 percent are women. These individuals tend to be women of color and have the most significant economic hardships attending college.

Being classified as an independent student means the student is 24 years of age or older; married; a veteran or member of the armed forces; an orphan in foster care or a ward of the court; an emancipated minor; homeless or at risk of being homeless; or has a legal dependent other than a spouse (“Federal Student Aid,” 2018). With so many factors that decrease the likelihood of completion being the very things that make a student independent, it is no wonder independent students are less likely to complete a degree (deBoef, 2018).

FAFSA Status

The FAFSA is the starting point to receive any state or federal aid. However, applying does not guarantee aid. The federal government and colleges can flag the application for verification (“Next Steps: Federal Student Aid Verification,” 2018). In essence, there are three FAFSA statuses: (1) student who submits a FAFSA and completes the verification requirements; (2) a student who submits the FAFSA but does not complete the verification requirements; and (3) a student who does not submit the FAFSA and consequently has no verification requirements.

The application alone can be intimidating, and when a student is selected for verification, either by the federal government or the college, it can become overwhelming. The verification process is in place as a way to review the data provided on the FAFSA (“Next Steps: Federal Student Aid Verification,” 2018). Providing a college financial aid office with documentation such as student and parent tax returns and other papers and forms may be required by the student. This process of verification extends the period before an award letter is generated, creating one more barrier for students. (Evans, Nguyen, Tener, & Thomas, 2017). One study, specifically about community college students in California, concluded that the “quantitative and qualitative analyses both support the hypothesis that the

red tape students encounter after filing their FAFSA prevents eligible applicants from receiving aid” (Cochrane, LaManque, & Szabo-Kubitz, 2010).

While there has been much research on the relationship between persistence and students who complete the FAFSA, very little research has been done on the relationship between persistence and students who complete the FAFSA but not the verification process. One research project conducted by Novak & McKinney (2011) on the relationship between full-time students’ filing the FAFSA and first-year persistence rates concluded that students who did not apply were less likely to persist. They found that lower-income students who did complete the FAFSA had 122 percent higher odds of returning the following semester than those who did not. Since the verification process can be a barrier for students, the findings of this study, which provides additional research in the area between the FAFSA and the award letter, could aid in student persistence and completion for community college students.

Community colleges enroll a large number of low-income students. These students have the most need for financial aid to persist and complete (Cohen & Brawer, 2008; Kezar, 2010; Novak & McKinney, 2011; Perna & Thomas, 2008). Students who do not submit the FAFSA have a harder time managing school with other demands of life. They are more dependent on financial aid to remain enrolled and complete compared to their peers (Long & Riley, 2007). Working more hours, enrolling part-time, or taking a semester off because they cannot afford tuition are all factors that decrease their chances of completing a college credential (Kantrowitz, 2009a; McKinney & Roberts, 2012; Novak & McKinney, 2011).

Dependent Variable

On-Time Completion

Metrics utilized for state and federal reports refer to on-time completion as normal time, which means one or two years for community college students (Juszkiewicz, 2015), depending on the program of study. However, the traditional timeline to graduation does not necessarily fit the diverse backgrounds of community college students. Not completing on-time can add expense for students in the form of additional tuition and fees as well as lost wages while enrolled in college.

Many community college students have additional commitments such as work and family that may not allow full-time college enrollment. Of the half-million community college students studied for enrollment patterns, only seven percent had two academic years of full-time enrollment. The other 93 percent of students either enrolled part-time at some point or stopped attending (Shapiro et al., 2016). Reducing barriers that lead to additional time to graduate will likely increase completion rates, which ultimately benefits the students regarding college tuition and fees as well as lost wages while attending college.

Summary

From the literature review, it is evident that college completion has been studied for many years in many different forms. The purpose of this study was to examine the relationships between demographic, academic, and financial characteristics with on-time completion at a small, rural Iowa community college. While many variables have been identified through previous research, the populations of the studies have many times been from large urban settings. Analyzing data specifically from a rural Iowa Community College will add to the existing field of community college completion information. While this

information may not be generalizable to all community colleges in the United States, it could provide the background to explore individual characteristics of student completion and improve new and current practices related to persistence, retention, and completion for rural community colleges. The relationship among these variables will be analyzed and put to use in helping to identify ways to increase on-time completion rates. It will aid the institution in determining predictors of success and completion and establishing policies and practices for both academic and social support systems that are proactive rather than reactive when students begin to struggle and fail.

CHAPTER 3. METHODOLOGY

The purpose of this study was to examine on-time completion for a cohort of first-time-in-college, credential-seeking students who started at North Iowa Area Community College (NIACC). The cohort of students began in the fall semesters between 2010 and 2013. The study followed this cohort for two years from their initial enrollment. The results presented after analysis will be on credential completion and the awarding of a certificate, diploma, or associate degree from the institution that provided the cohort of data. Increasing credential completion has been a national and state initiative since 2009 when former President Obama called for action so that the U.S. would once again lead the nation in educational attainment. His goal was for every American to have at least one year of postsecondary education beyond high school by 2020 (“Higher Education—The White House,” 2016). Ten years after this call to action and under the leadership of a new president, credential completion is still a national focus but has become the spotlight for the state of Iowa and Future Ready Iowa initiatives.

This chapter includes an overview of the methodology that guided this study. The independent variables selected have been used in research about predictors of success on enrollment, persistence, retention, and completion. Summarized below are the methodological approaches the researcher used in the study including hypotheses, variables, methodology, and limitations of the study.

Research Questions

Based on the objectives of this study, the following research questions were addressed:

1. What are the demographic, academic, and financial characteristics of students who enrolled during the fall semesters of 2010 through 2013 at a rural Iowa community college?
1. What are the potential relationships between demographic characteristics and the likelihood of on-time completion?
2. What are the potential relationships between academic characteristics and the likelihood of on-time completion?
3. What are the potential relationships between financial characteristics and the likelihood of on-time completion?
4. If demographic, academic, and financial characteristics do predict on-time completion, do the results differ for students who completed the FAFSA and any required verification processes versus a student who did not complete the FAFSA and required verification?

Hypothesis

According to Creswell (2014), a null hypothesis predicts that there is no relationship or significant difference in the predictor and outcome variables, whereas the alternative hypothesis predicts that the predictor variable does indeed impact the outcome variable. For this study, all research questions except Research Questions 1 and 5, which are descriptive in nature, assumed a null hypothesis, or that the independent variables do not influence the likelihood of on-time credential completion.

RQ2. What are the potential relationships between demographic characteristics and the likelihood of on-time completion?

H2: Based on previous findings, male students complete at a lower level than females (Buchmann & DiPrete, 2006; Conger & Long, 2010; Lopez, 2009; Turk, 2017).

These findings are based on urban student samples, and the completion rates of rural students will not differ significantly for the cohort of students in this study. However, for the rest of the variables related to delayed enrollment after high school (Choy & Phillips, 2002; Craig & Ward, 2008; Shapiro et al., 2016, 2017), underrepresented populations, specifically Black and Latinx students (Perna, 2007; Shapiro et al., 2017; Strayhorn & Johnson, 2014) and first-generation students (Fike & Fike, 2008; Redford et al., 2017), there will be a significant difference, as previous research finds, in urban and rural students.

RQ3: What are the potential relationships between academic characteristics and the likelihood of on-time completion?

H3: Previous research finds academic characteristics do impact on-time completion for both urban and rural students. Therefore, first term of enrollment (Driscoll, 2007; Fike & Fike, 2008), the more developmental courses required for a student to enroll in a college-level course (Calcagno et al., 2007; Fong et al., 2015), and housing arrangement (Moeck et al., 2007, 2008; Pascarella & Terenzini, 2005; Schudde, 2011) will yield a significant difference in on-time completion. While there is research about completion for students who earn college credits while in high school, little is found on rural college students who complete on-time, however, logic suggests that students who do earn college credits will have a higher rate of on-time completion than their peers who do not have college credits.

RQ4: What are the potential relationships between academic characteristics and the likelihood of on-time completion?

H4: Previous research finds that EFC does impact the likelihood of on-time completion (Adelman, 2006; Bailey, Calcagno, Jenkins, Kienzl, & Leinbach, 2005; Beekhoven, De Jong, & Hout, 2002; Morest & Bailey, 2005), as does dependency status

determined by the FAFSA (Davidson, 2015; Ma & Baum, 2016; McKinney & Novak, 2015; Novak & McKinney, 2011). In reviewing literature related to demographic, academic, and financial characteristics and students' FAFSA application status with on-time completion, none was found. Studies reviewed used a 150 percent of normal time to completion or 300 percent of normal time to completion as their measure of success (Bailey et al., 2005; Schudde & Scott-Clayton, 2016; Walton, Lutz Berkner, Wheelless, Shepherd, & Hunt-White, 2010). However, logic suggests that students who complete the FAFSA and required verification process will be more likely to complete on-time, as found with other time frames to success.

Data Collection

This study supplemented previous research about credential completion in community colleges by examining factors that may impact NIACC student success. The researcher hypothesized the outcomes before the actual data was collected based on previous research and what was presented in the literature review. The predicted outcome was that demographic, academic, and financial characteristics do affect community college credential completion. Existing literature on demographic, academic, and financial characteristics as outlined in the literature review did indeed influence completion or lack thereof.

A quantitative approach was used to test the hypothesized relationship between the demographic, academic, and financial characteristics identified. The predictive correlational design utilized descriptive statistics and conducted a logistic regression analysis with a dichotomous dependent variable of on-time credential completion. It analyzed student demographic information, academic characteristics, and financial characteristics to predict the likelihood that a student would complete a credential on-time.

Data Source

The site of this study was North Iowa Area Community College in North Central Iowa. The college enrolls approximately 3,000 students per year. The nine-county service area for the college has approximately 130,000 residents. The town in which the college is located has about 28,000 residents. Over 80 percent of the students at this institution are from the nine-county service area.

The population sample was comprised of students who enrolled at NIACC. A small, rural college located in North Central Iowa, it enrolls every fall approximately 800 new, first-time-in-college students. Being the oldest community college west of the Mississippi, NIACC has provided career and technical as well as transfer programs since 1918.

The data that was used in this study was approved and provided by the offices of Institutional Effectiveness and Organizational Development and Information Technology at NIACC.

Variables

A brief description of each variable as well as how the variable was obtained is listed below. A list of the variables and coding structure can be found in Table 3.

Dependent Variable

On-time Credential Completion

The dependent variable used in this study was on-time credential completion. For this study, credential completion was defined as students who attained a credential in the normal time of completion as determined by the program type: a certificate or diploma program in one academic year (fall, spring, and summer term) and an associate degree in two years (fall, spring, summer terms for two consecutive years).

Independent Variables

Student Demographic Information

Student demographic variables are related to the person. These variables are all things the student has no control over. Variables included were gender, age, race/ethnicity, and educational backgrounds of the students' parents and proximity to campus.

Sex: Collected from the application for admissions and was self-reported by the student.

Years to college enrollment: Determined by the number of years from high school graduation before the student enrolled in college. Students who earned a General Education Diploma (GED) were classified in their own category due to not having a high school graduation year.

Underrepresented student: Determined by the student self-identifying their ethnicity and race on the application for admission. White, Black, and Latinx were coded individually, but due to the low cell numbers for all other races the remaining races and more than one race were grouped together.

First-generation student: This variable was self-identified on the application for admission and was described as a student whose mother and father had not obtained bachelor's degrees or higher. When a student identified only one parent's educational background, the student was classified as missing information for this variable.

Academic Characteristics

Academic characteristic variables are things the students have chosen to do either while in high school or once attending the community college. Academic variables selected for analysis while in high school were dual enrollment, and college math readiness.

Variables chosen for students while in college were enrollment status as well as housing arrangement during the first term of enrollment.

Dual enrollment: Dual enrollment was determined to be a student who enrolled directly from high school, whether or not college credits were earned at the institution (NIACC) while in high school. Any student who delayed enrollment after high school and was not from a high school within the service area was coded as having not earned dual credit.

Math placement level; The level of math was determined by the math placement assessment of either the American College Testing (ACT) math, Scholastic Aptitude Test (SAT) math, or COMPASS assessment scores. Students were required to submit with their application for admission an assessment score. Table 2 provides the math placement levels for each of the math assessments.

Housing arrangement: Housing arrangement was determined by whether a student had an on-campus housing assignment for the first term of enrollment and was coded as a categorical variable.

Enrollment status: This variable is a categorical variable of full-time or part-time status.

Table 2.

Mathematics Placement Levels

No Developmental Math Required (College Algebra placement)	One level below College Algebra (Intermediate Algebra placement)	Two levels below College Algebra (Beginning Algebra placement)	Three levels below College Algebra (Pre-Algebra Placement)
Compass Algebra >76	Compass Algebra 51–75	Compass Algebra 1- 50	Compass Pre- Algebra <75
ACT Math > 21	ACT Math 16-20	ACT Math 13–15	ACT Math < 12
SAT Math > 500	SAT Math 390–480	SAT Math 300–360	SAT Math < 280

Financial Characteristics

Completing the FAFSA is the gateway to federal and state financial aid. Because of this, the variables used for the financial characteristics were obtained from the FAFSA and the Institutional Student Information Record (ISIR). This record was transmitted from the Department of Education to the institutions the student identified as potential colleges for them. The colleges transmit the FAFSA data so they could finish the FAFSA application process and make a financial aid award.

Estimated Family Contribution (EFC): This variable was collected from the ISIR and was used as an indication of socioeconomic status (SES). This variable was coded in increments: very low, low, middle, and high SES. Any zero EFC was deemed a very low socioeconomic status, and any EFC over \$20,000 was considered a very high SES.

Dependency status: As determined by the FAFSA requirements of dependency status, this variable was pulled from the ISIR on file with the college and was categorical using dependent or independent status.

FAFSA completion and award: Receiving an award means the students not only submitted the FAFSA but completed the necessary paperwork and requirements to have their aid transmitted by the college. Some students apply but never complete the application process, which includes federal or institution verification requirements. If a student does not comply with verification requirements, no financial aid is awarded. Some students never submit a FAFSA and either pay the college expenses in full or arrange a payment plan to pay off the costs throughout the semester they are enrolled.

Limitations and Delimitations

The scope of this study was limited to students who enrolled at NIACC and were self-identified as a first-time-in-college, credential-seeking students. Many of the variables were

self-reported at the time of application, which became a limitation. The reason being, first, some variables were not provided by the student; therefore, the total number available for a variable will be different from the total population ($n = 3,054$). Second, the self-reported data at the time of application for admissions could possibly change between the time of enrollment and completion. Third, some variables used in this study could not give the full picture of a student's progress from the first semester to graduation. Thus, the results of this study were not generalizable to all community colleges. However, with similarities between cohorts enrolling every fall semester at this institution, this information can be generalized and used for future predictions and planning for this institution.

It is important to note that the information provided to the researcher contained no identifying information. Because this student information was not provided, there possibly were students in this study who earned multiple credentials and would be counted as individual records for each credential.

Data Analysis

Descriptive Statistics

The purpose of descriptive statistics is to reduce the data to a more understandable and straightforward way of summarizing. Numeric and table summaries were provided to aid in understanding the information that was included in this study (Agresti & Finlay, 2009). For this study, descriptive statistics were used to explore the demographic, academic, and financial characteristics of NIACC students. The students described in this study were enrolled at this small, rural institution and might not represent other rural community colleges.

Inferential Statistics

Logistic regression was used to investigate research questions 2, 3, and 4. Binary logistic regression was most appropriate for this analysis because the dependent variable was dichotomous. The binary logistic regression used the set of independent variables to predict the dependent variable. For binary responses, it is commonly referred to as success or failure (Agresti & Finlay, 2009). Advantages of binary logistic regression are that it requires no assumptions about the distribution of the independent variables and the variables do not have to be normally distributed (Mertler & Vannatta, 2013). Logistic regression can analyze variables of all types. Blocks of data were used to estimate the probability of an event occurring, which for this study was on-time credential completion.

Logistic regression has a set of assumptions that need to be considered (Laerd Statistics, 2015). The first several assumptions were discussed earlier in the study design. The dependent variable is dichotomous, observations are independent, the dichotomous dependent variable and the independent variables are mutually exclusive, and there are at least 50 cases per each of the independent variables (Laerd Statistics, 2015).

The remaining assumptions require testing of the data. To establish that there is indeed a linear relationship between the independent variables and the logit transformation of the dependent variable, a Box Tidwell was performed. A second test was conducted to show multicollinearity. Multicollinearity occurs when two or more independent variables are highly correlated. Reviewing the correlation of coefficients and tolerance (VIF values) will determine multicollinearity. And lastly, there need to be no significant outliers. Producing a case-wise diagnostic will inform the researcher if any cases are somehow unusual.

The project utilized the software package International Business Machines Corporation (IBM) Statistical Package for the Social Sciences® (SPSS) 24 to conduct the

analysis. The institution provided an Excel® spreadsheet with the information requested for this study. The spreadsheet was loaded in SPSS 24 to perform the statistical analysis.

Summary

The primary purpose of the study was to add to the existing literature on rural community college credential completion. By investigating the variables that impacted the dependent variable, on-time credential completion at NIACC, staff can better understand the current student needs and prepare for future student success. In turn, providing top-quality services to encourage and support student success benefits not only the individual but also communities in North Central Iowa and the families who reside there. This project was to assist NIACC administrators with future enrollment, persistence, and completion planning. The next two chapters will provide the results, implications, and conclusions.

CHAPTER 4. FINDINGS

This chapter provides an overview of the study's results through the analysis of tables, figures, and explanations. The results are structured around the demographic, academic and financial characteristics. Research question 1 (RQ1) is a descriptive analysis for the entire population of first-time-in-college students who enrolled at NIACC in the fall semesters of 2010, 2011, 2012, and 2013. For research questions 2, 3, and 4, (RQ2, RQ3, RQ4) a logistic regression analysis is the primary analysis used for this research and is performed to investigate the demographic, academic, and financial characteristics that are most influential in determining on-time credential completion for a medium size rural-serving community college in Iowa. Research question 5 (RQ5) explores the impact of a student's financial aid status of completing the FAFSA and verification process and being awarded a financial aid package—specifically, if demographic and academic variables are statistically significant in predicting on-time completion, are the outcomes different for students who complete the FAFSA requirements and receive a financial aid award package versus those who do not complete the FAFSA requirements and do not receive a financial aid award.

The study design involves a quantitative analysis of a sample consisting of 3,054 students. The variables included are selected based on the literature review presented in Chapter 2. The purpose of the study is to explore the relationship between demographic, academic, and financial variables that can predict on-time completion of a credential at this rural community college in Iowa. On-time completion, the dependent variable, is coded to indicate whether students completed their program of study in one year for certificate and diploma programs and two years for associate degrees.

The eleven original independent variables in the study consist of: sex (SEX), age at college enrollment (AGE), underrepresented populations (RACE), first-generation student status (FIRST_GEN), dual enrollment (DUAL_ENROLL), math placement level (MATH_LEVEL), housing arrangement for the first term of enrollment (HOUSING) first term enrollment (FIRST_TERM), estimated family contribution (EFC), dependency status (DEPEND_STATUS), and FAFSA status (FIN_STATUS). After the initial analysis of the continuous variables, all three—(AGE), (DUAL_ENROLL) and (FIRST_TERM)—are changed to categorical variables.

Due to the majority of the students being 18 years old, there is perfect collinearity when testing for linearity which forces the variable out of the model. Therefore, the (AGE) variable is defined as years from high school (ENROLL_YRS) and measures the number of years after a high school student enrolls in college for the first time. The (ENROLL_YRS) variable now includes for analysis: 1 = immediately following high school, 2 = 1–4 years after high school, 3 = 5 or more years after high school and 4 = a student who earned a GED. Because the possible year of high school graduation is not collected on GED recipients, all GED students are categorized together.

The same issue of linearity is found for the (DUAL_ENROLL) variable because over two-thirds of the sample did not earn college credits. Therefore (DUAL_ENROLL) is recoded as a categorical variable that includes: 1 = no dual enrollment credit, 2 = 1–12 hours of credits earned, 3 = 13–24 hours of credits earned, 4 = 25+ credit hours earned, which equates to one year of college credits.

After utilizing cross tabulations to explore the first-term continuous variable, some cells are empty, causing errors. Because of these errors, the (FIRST_TERM) continuous variable is recoded to where 0 = part-time and 1 = full-time.

Descriptive Analysis

The distribution of the demographic, academic, and financial variables (RQ1) are presented in the following tables. All independent variables are shown in Table 5 and provide the frequencies and the percentages of each category as well as the frequency and percentage of students who completed a credential on-time.

In several cases, this sample does not follow the national trends of community college enrollments. As indicated in Table 4, 54 percent of the entire sample is male students. This contradicts the research provided in the literature review where more females enroll than males. Another difference is that only 13 percent of the total sample identify as an underrepresented population. That means 87 percent report they are White. According to the American Association of Community Colleges Fact Sheet (2017), less than half of community college students identify as White. This sample population is younger than the national average of 28 years old, with over three-quarters of the population being traditional in age (average age of 20). This sample population is found to be different as well in that more students enroll full-time rather than part-time.

Traditional enrollment, meaning enrolling immediately following high school graduation, accounts for 79 percent of the total sample population. There is six percent of the students who earned a GED. Because of data collection, no potential high school graduation year is reported, so GED students are categorized together. Their ages range from 18 to 54

years old. Students who delayed up to four years before enrolling and those who delayed more than five years are eight percent and seven percent, respectively.

Of the first-time-in-college student sample, 78 percent live off-campus, which follows the literature of living arrangements of community college students (“Community college trends and statistics,” 2015). Being a rural community college in Iowa, the geographic distribution is that over 80 percent of students reside within the nine-county service area, it is not surprising that the majority of the students enrolled do not live on-campus. The majority of the sample ($n = 2,920$) provided both parents’ education level with 68 percent being considered first-generation students which is higher than the national community college average of 36 percent (*Fast Facts* - AACC, 2017).

Of the total sample, only four percent of the students (115) did not have a math assessment score on file. Of the 96 percent who do have math assessment scores, 77 percent place at a remedial level. Six percent of students place one level below college-level math (Intermediate Algebra); 55 percent place two levels below college-level math (Beginning Algebra); and 16 percent place three levels below college-level math (Pre-Algebra). Of the total sample, 19 percent of the students assessed place at college-level math. As stated in the literature review, over 60 percent of first-time-in-college students place at a developmental level.

The financial variables find that 15 percent of the total population ($n = 466$) do not submit a FAFSA. Among those who did complete the FAFSA ($n = 2,588$), twenty-eight percent were found to have a zero EFC. A zero EFC for this study is the lowest socioeconomic status. These students are the neediest in terms of receiving federal and state aid to help them cover the costs of their education. Of the students who completed

Table 3.

Variable Descriptions and Coding

Variable	Description	Variable Coding
<u>Demographic Variables</u>		
Sex (SEX)	Biological sex of student	0 = female 1 = male
Years to College Enrollment (ENROLL_YRS)	Number of years between high school graduation and first-time enrollment	1 = immediately following HS 2 = 1–4 years after HS 3 = 5 or more years after HS 4 = earned GED
Underrepresented Students (RACE)	Ethnicity/Race	0 = White 1 = Black 2 = Latinx 3 = other
First-Generation Students (FIRST_GEN)	Mother and Father earned a bachelor's degree	1 = continuing-generation 2 = first-generation 3 = null
<u>Academic Variables</u>		
Dual Enrollment (DUAL_ENROLL)	Number of credits a student earned at NIACC prior to high school graduation	1 = no credits earned 2 = 1–12 credit earned 3 = 13–24 credits earned 4 = 25+ credits earned
Math Placement Level (MATH_LEVEL)	The level of math a student placed at prior to enrollment	1 = college math 2 = 1 level below 3 = 2 levels below 4 = 3 levels below 5 = no assessment scores
Housing Arrangement (HOUSING)	Housing arrangement first term of enrollment	0 = off-campus/commuting 1 = on-campus
Enrollment Status (FIRST_TERM)	Enrollment status for the first term	0 = part-time 1 = full-time

Table 3. (continued)

Financial Variables

Estimated Family Contribution (EFC)	Estimated Family Contribution dollar amount	1 = no EFC 2 = zero EFC 3 = \$1–5,999 EFC 4 = \$6,000–\$19,999 EFC 5 = \$20,000+ EFC
Dependency Status (DEPEND_STATUS)	Student status from financial aid application	1 = dependent 2 = independent 3 = no status
FAFSA Status (FIN_STATUS)	Status of the financial aid process	0 = financial aid award 1 = no financial aid award

the FAFSA, seven percent have a higher than \$20,000 EFC, which is considered a high socioeconomic status. There are 2,175 students (71 percent) who, by the definition of the FAFSA, are considered dependent students.

On-time completion at this medium size, rural-serving community college for this sample is 27 percent. The highest on-time completion variable is the credits earned while in high school, where approximately two-thirds of the students who earn more than one year of college credit hours while in high school complete on-time. In addition to the students who earn credits while in high school, over half of the students who have an EFC that categorizes them as high socioeconomic status complete on-time.

Areas of concern for low on-time completion rates are for underrepresented populations – specifically, just seven percent of Black students complete on-time and 13 percent of Latinx students. Of the students who complete the GED, only nine percent complete on-time

Table 4.

Frequencies and Percentages for Independent Variables and On-Time Completion

Variable	<i>N</i>	%	<i>N</i>	%
On-Time Completion				
Sex				
Female	1,414	46	368	26
Male	1,640	54	446	27
Total	3,054	100		
Enrollment after High School				
Traditional enrollment	2,410	79	732	30
1–4 years after HS graduation	233	8	33	14
5+ years after HS graduation	223	7	33	15
GED graduates	188	6	16	9
Total	3,054	100		
Underrepresented Populations				
White	2,648	87	766	29
Black	197	7	13	7
Latinx	144	5	18	13
Other	65	1	17	26
Total	3,054	100		
First-Generation Students				
No	839	28	274	33
Yes	2,081	68	517	25
Missing	134	4	23	1
Total	3,054	100		
Dual Enrollment				
No credits earned	2,070	68	386	19
1–12 credits earned	466	15	157	34
13–24 credits earned	336	11	154	46
25+ credits earned	182	6	117	64
Total	3,054	100		
Math Placement Level				
College Algebra	591	19	272	46
Intermediate Algebra	181	6	64	35
Beginning Algebra	1,687	55	401	24

Table 4. (continued)

Pre-Algebra	480	16	72	15
No Assessment Score	115	4	5	4
Total	3,054	100		
Housing Arrangement				
Off-Campus	2,390	78	644	27
On-Campus	664	22	170	26
Total	3,054	100		
Enrollment Status				
Part-time	518	17	22	4
Full-time	2,536	83	792	31
Total	3,054	100		
Estimated Family Contribution (EFC)				
No EFC	466	15	108	23
Zero EFC	841	28	116	14
\$1–5,999 EFC	819	27	227	28
\$6,000–\$19,999 EFC	726	24	290	40
\$20,000+ EFC	202	6	73	36
	3,054	100		
Dependency Status				
Dependent	2,175	71	645	30
Independent	413	14	61	15
Did not submit FAFSA	466	15	108	23
Total	3,054	100		
FAFSA Status				
Financial Award	2,444	80	669	27
No Financial Award	610	20	145	24
Total	3,054	100		

as do students who have an EFC range of \$1–\$5,999, which classifies them as low socioeconomic status. Table 4 provides the full listing of on-time completion rates for this sample.

Regression Analysis

In order to answer the research questions 2, 3, and 4 of whether demographic, academic, and financial characteristics do indeed predict on-time completion of first-time-in-college students, a logistic regression was run. Logistic regression allows for a dichotomous variable to estimate the probability of the event occurring (Agresti & Finlay, 2009). The analysis is conducted to assess the extent to which the 11 identified variables predict on-time completion. Research questions 2, 3, and 4 are entered in as block data for each of the areas analyzed.

When using logistic regression, some assumptions must be met to determine whether the model is appropriate (Laerd Statistics, 2015). One, in particular, is to assess for multicollinearity, which is when independent variables overlap and any one is predicted by the others (Agresti & Finlay, 2009). Calculating the variance inflation factor (VIF) indices for each of the independent variables compared to the other variables in the study determines if there are issues with multicollinearity. Agresti & Finlay (2009) states that a VIF of ten or greater indicates multicollinearity. When variables for this study are tested, the largest VIF is 4.08; therefore, no issues are found pertaining to multicollinearity.

It is important to note that the researcher increased the standard deviation to ± 2.5 when performing the case-wise listing of residuals due to having over 40 cases listed with residuals at ± 2.0 . Once the standard deviation was increased to ± 2.5 , two cases were still problematic with standardized residual values higher than 4.904, so each case was eliminated from the analysis of this study.

Analyzing the output from the logistic regression informs the researcher which independent variables have a statistically significant effect on the dependent variable, on-

time completion, and how well this logistic regression model predicts on-time completion.

Tables and a narrative are available for research questions 2, 3, and 4.

Several variables involved groups of individuals who did not provide the information collected for this analysis or it was not available; first-generation students (FIRST_GEN), math placement level (MATH_LEVEL), and dependency status (DEPEND_STATUS).

There were three groups of individuals with missing data. First, 4.4 percent of students did not provide information needed to determine whether a student was a first-generation student or not. Second, 3.8 percent of student did not have a math placement score and finally, 15.3 percent of respondents did not provide information needed to determine dependent status or EFC. While the EFC group was missing information, they were included as a student who received no financial aid award since no award package was issued. After further review, dummy variables were established for each of these variables in order to allow the variables to be used in this regression analysis despite the individual cases that did not have all data elements.

Demographic Characteristics

The first block of independent variables (RQ2) focused on demographic information and included the variables sex, years from high school graduation, underrepresented populations (race), and first-generation student status. Of these variables, sex and first-generation student status are categorical variables. The logistic regression block of variables is statistically significant, $[-2 \log \text{likelihood} = 3,338.815, \chi^2(8) = 160.207, p \leq .001]$. The model explains nine percent (Nagelkerke R^2) of the proportion of the total variability of the outcome that is accounted for by the model for on-time completion and correctly classifies 73.3 percent of the cases. The Hosmer and Lemeshow goodness-of-fit test is not statistically significant at $p < .865$, indicating the first model is a good fit.

In the first block of variables, sex was not significant which indicates that the likelihood of completing on-time does not differ between females and males. For the years to college enrollment variable, enrolling immediately following high school was used as the reference group when examining this variable. All three categories, students who enrolled between one and four years after high school, students who enrolled more than five years after high school and GED graduates was significant ($p \leq .001$). Students who delay enrollment in college anything more than a year are less likely to complete on-time than their peers who enroll immediately following graduation; 0.455 times less likely for students who wait one to four years to enroll and 0.512 for students who wait more than five years. Students who earned a GED are 0.224 times as likely to complete on-time in comparison to students who enrolled immediately following high school.

For the underrepresented students, White students were used as the reference group. The analysis found that Black and Latinx students were significantly lower with on-time completion relative to White students. The students who were classified as other races or multi-racial were not significant meaning their rate of on-time completion did not differ from White students. The last variable in this block found that first-generation students ($p \leq .004$) were .764 times less likely to complete on-time than students who had both parents who earned bachelor's degrees.

Academic Characteristics

The second block of variables added to the model were related to academic choices made while in high school and college. They include dual enrollment, math placement level, housing arrangement, and enrollment status. This block is statistically significant at [-2 log likelihood = 2,976.352, $\chi^2(4) = 371.463$, $p \leq .001$]. The model explains 25 percent (Nagelkerke R^2) of the proportion of the total variability of the outcome that is accounted for

by the model for on-time completion and correctly classifies 76 percent of the cases. Hosmer and Lemeshow goodness-of-fit test is not statistically significant at $p \leq .491$, indicating the model is a good fit.

Variables found to be significant are students who earned a GED ($p \leq .018$), Black students ($p \leq .001$), Latinx ($p \leq .002$), and first-generation students ($p \leq .014$). For dual enrolled students ($p \leq .001$), for each additional twelve hours of credit earned, students are 1.762 times more likely to complete on-time. The math placement level variable was significant ($p < .001$) and found that among those with math placement scores, each level below college level math a student places results in 0.697 times less likelihood of completing on-time. Enrollment status ($p \leq .001$) is a significant predictor of on-time completion where enrolling full-time the first term results in a student completing nearly eight times more than students who enroll part-time. After controlling for academic factors in this model, one to four years to college enrollment, five more years to college enrollment, and housing arrangement are not a significant predictor of on-time completion. The previous block of variables that were not significant remained non-significant (sex, and other/multi-race students).

Financial Characteristics

The third and final block adds three variables into the model and is related to the financial characteristics of the students. They are EFC as an indicator of SES, dependency status, and FAFSA status. The block of variables is statistically significant [$-2 \log \text{likelihood} = 28.906 \chi^2 (3) = 560.576, p \leq .001$]. The model explains 26 percent (Nagelkerke R^2) of the proportion of the total variability of the outcome that is accounted for by the model for on-time completion and correctly classifies 76 percent of the cases. The variables significant in this block of data are Black students ($p \leq .001$), Latinx ($p \leq .005$), enrollment in college one

to four years after high school graduation ($p \leq .005$), dual enrolled students ($p \leq .001$) math placement level ($p \leq .001$) and enrollment status ($p \leq .001$) and EFC ($p \leq .001$)

It is important to note that the overall model includes three dummy variables as indicators of missing information. The chi-square of the overall logistic regression model was adjusted to remove the dummy variables and was found to be significant, $\chi^2(15) = 560.576, p \leq .001$. The Hosmer and Lemeshow goodness-of-fit test is not statistically significant at $p \leq .497$, indicating that the third model is a good fit. With each model in this analysis, the -2 log likelihood value decreased, the Nagelkerke R^2 value increased, and percent accuracy in classification increased signifying that the data is a good fit for the model.

When adding financial variables in the third and final model, the results found the following variables to be significant – underrepresented Black students, underrepresented Latinx students, students who enrolled one to four years after high school graduation, dual credits earned, math placement level, enrollment status, and EFC. Table 5 provides the results for each variable.

Underrepresented students, specifically Black students and Latinx students, were less likely to complete on-time. The odds ratio for Black students is 0.373 with a 95% confidence interval of [0.204, 0.682]. This suggests that Black students have a less likelihood of completing on-time when tested against their White peers and Latinx students are found to be similar in that their odds ratio is 0.472 with a 95% confidence interval of [0.280, 0.795] making them less likely to complete on-time relative to White students. The odds ratio for students who enroll in college one to four years after high school graduation is .0759 with a

95% confidence level of [0.617, 1.423] meaning that students who take one to four years off before enrolling in college are 0.759 less likely to complete on-time.

Of the four academic variables, three were significant in predicting on-time completion – dual enrollment, math level placement, and enrollment status. The odds ratio for dual credits earned is 1.756 with a 95% confidence interval of [1.590, 1.938]. This means that for every twelve hours of credit earned prior to high school graduation, the odds of completing on-time increases by 1.756 times. For student math placement levels, the odds ratio is 0.714 with a 95% confidence interval of [0.652, 0.783] meaning that for every level below college math that a student places at, their likelihood of completing on-time decreases by 0.714. Enrollment status is a strong indicator of success. When a student enrolls full-time the first term of enrollment, the odds ratio is 7.871 which means the likelihood of completing on-time is almost eight times higher than a student who enrolls part-time the first term of enrollment.

Of the three financial variables only EFC, which is being used as an indicator of socioeconomic status, was significant. The odds ratio was 1.355 with a 95% confidence interval of [1.212, 1.516]. This indicates that with increasing ability to pay for college, the likelihood of completing on-time increases by 1.355 times. The other two variables, dependency status and FAFSA award status, were not significant in this analysis.

FAFSA Completion

State and national initiatives are in place to encourage the completion of the FAFSA to help college-going students finance their education. RQ5 is comparing outcomes of the variables that do predict on-time completion and how the outcomes differ for students who receive a financial award and those who did not receive a financial award. For this analysis, only

Table 5.

Logistic regression predicting the likelihood of on-time completion

	<i>B</i>	S.E.	Wald	<i>df</i>	<i>p</i>	Odds Ratio	95% C.I. for EXP(B)	
							Lower	Upper
Block 1								
Sex	0.126	0.085	2.185	1	.139	1.135	0.960	1.341
Underrepresented								
Black	-1.711	0.293	34.137	1	.000*	0.181	0.102	0.321
Latinx	-1.036	0.258	16.144	1	.000*	0.355	0.214	0.588
Other/Multi-racial	0.015	0.294	0.002	1	.961	1.015	0.570	1.806
Years from HS								
1-4 Years	-0.787	0.198	15.750	1	.000*	0.455	0.309	0.672
5 Plus Years	-0.669	0.200	11.186	1	.001*	0.512	0.346	0.758
GED	-1.497	0.268	31.288	1	.000*	0.224	0.132	0.378
Generation Status	-0.269	0.092	8.476	1	.004*	0.764	0.638	0.916
Constant	-2.839	0.505	31.663	1	.000	0.058		
Block 2								
Sex	0.060	0.092	0.427	1	.514	1.062	0.886	1.273
Underrepresented								
Black	-1.219	0.304	16.071	1	.000*	0.296	0.163	0.536
Latinx	-0.837	0.266	9.904	1	.002*	0.433	0.257	0.729
Other/Multi-racial	-0.288	0.319	0.816	1	.366	0.749	0.401	1.401
Years from HS								
1-4 Years	-0.133	0.209	0.408	1	.523	0.875	0.581	1.318
5 Plus Years	0.246	0.215	1.312	1	.252	1.279	0.839	1.951
GED	-0.657	0.278	5.562	1	.018*	0.518	0.300	0.895
Generation Status	-0.244	0.100	6.020	1	.014*	0.783	0.644	0.952
Dual Credits Earned	0.566	0.050	127.737	1	.000*	1.762	1.597	1.944
Math Level	-0.361	0.047	60.315	1	.000*	0.697	0.636	0.763
Housing Arrange	0.144	0.116	1.528	1	.216	1.154	0.919	1.450
Enrollment Status	2.075	0.231	81.061	1	.000*	7.967	5.071	12.518
Constant	-4.882	0.572	72.924	1	.000	0.008		
Block 3								
Sex	0.047	0.093	0.251	1	.616	1.048	0.873	1.257
Underrepresented								
Black	-0.985	0.307	10.275	1	.001*	0.373	0.204	0.682
Latinx	-0.751	0.266	7.957	1	.005*	0.472	0.280	0.795
Other/Multi-racial	-0.235	0.319	0.541	1	.462	.791	0.423	1.479

Table 5. (continued)

Years from HS								
1-4 Years	-0.065	0.213	0.094	1	.005*	0.759	0.617	1.423
5 Plus Years	0.270	0.296	0.836	1	.360	1.310	0.734	2.338
GED	-0.537	0.322	2.781	1	.095	0.585	0.311	1.099
Generation Status	-0.136	0.102	1.784	1	.182	0.873	0.714	1.066
Dual Credits Earned	0.563	0.050	124.609	1	.000*	1.765	1.590	1.938
Math Level	-0.336	0.047	51.268	1	.000*	0.714	0.652	0.783
Housing Arrange	0.118	0.117	1.013	1	.314	1.125	0.894	1.416
Enrollment Status	2.063	0.231	76.670	1	.000*	7.871	5.004	12.382
EFC	0.304	0.057	28.224	1	.000*	1.355	1.212	1.516
Dependent Status	0.159	0.244	0.423	1	.515	1.172	0.726	1.891
FAFSA Award Status	0.009	0.232	0.001	1	.969	1.009	0.641	1.589
Constant	-4.863	0.621	61.302	1	.000	0.008		

*Significant at $p < .05$; Key: CI=Confidence Interval; Underrepresented is for Black, Latinx and other/multi-racial compared with White; Years from HS is 1-4 years after HS, 5+ year after HS and GED graduates compared with traditional students.

demographic and academic characteristic variables are analyzed due to the financial variables being related to the information collected on the FAFSA. Table 6 provides statistically significant variables from the logistic regression conducted previously with each category of the variable for comparison of on-time completion of students with a financial aid award and those with no financial aid award.

While many outcomes for students who receive a financial aid award and those who do not are similar, there are several areas of interest for students who do not receive a financial aid award. Students who placed at a Beginning Algebra level (two levels below college math) and an Intermediate Algebra level (one level below college math) complete on-time at higher rates than students who do receive a financial aid award. The highest placement for math (College Algebra) and the lowest placement for math (Pre-Algebra) complete on-time at a higher rate when a financial aid award is present.

Dual credit seems like a variable that would allow students to complete on-time, and logically thinking, getting financial aid would likely increase the chances of completing on-time; however, this analysis finds the opposite. For students who do not receive a financial aid award and complete 13–24 dual college credits while in high school also complete on-time more than students who receive a financial award. This is the case with students who earn 25 or more credit hours as well. In contrast, a financial aid award package increases on-time completion for students who do not earn college credits while in high school and for those who earn less than one semester of credits (12 credit hours or less). Therefore, one can theorize that to increase their odds of graduating on-time, students who earn zero to 12 credit hours while in high school should complete the FAFSA process and receive an award package.

White students complete on-time at a high rate with or without a financial aid award. Underrepresented students, (Black, Latinx and other/multiple races) completed on-time at a higher rate with a financial award than without one but it still was minimal with only two percent completion on-time. Of the Black students who did not receive a financial aid award package (30 students), not one student completed on-time, and only two of the 33 Latinx students who did not receive an award package completed on-time. That calculates to a total of six percent of underrepresented students graduating on-time and three percent of the underrepresented populations who complete on-time with no financial aid award.

While this research does provide insight into on-time completion for variables related to students' demographic backgrounds and their academic characteristics, there are still many components that may contribute to completing a credential on-time such as how many hours

Table 6.

*On-Time Completion by Statistically Significant Demographic and Academic Characteristics
Cross Referenced to Financial Aid Award Status*

Financial Aid Award			No Financial Aid Award		
On-Time Completion	Variable Category	Variable	On-Time Completion	Variable Category	
94%	White	Underrepresented Student	97%	White	
2%	Black	Underrepresented Student	0%	Black	
2%	Latinx	Underrepresented Student	1%	Latinx	
2%	Other/multiple	Underrepresented Student	2%	Other/multiple	
48%	No credits	Dual Enrollment	47%	No credits	
20%	1–12 credits	Dual Enrollment	15%	1–12 credits	
18%	13–24 credits	Dual Enrollment	22%	13–24 credits	
14%	25+ credits	Dual Enrollment	16%	25+ credits	
34%	College Algebra	Math Placement Level	29%	College Algebra	
7%	Intermediate Algebra	Math Placement Level	10%	Intermediate Algebra	
48%	Beginning Algebra	Math Placement Level	53%	Beginning Algebra	
9%	Pre-Algebra	Math Placement Level	7%	Pre-Algebra	
0%	Null	Math Placement Level	1%	Null	
3%	Part-time	Enrollment Status	1%	Part-time	
97%	Full-time	Enrollment Status	99%	Full-time	
NA	No EFC	EFC	74%	No EFC	
2%	Zero EFC	EFC	2%	Zero EFC	
6%	\$1-\$5,999 EFC	EFC	6%	\$1-\$5,999 EFC	
17%	\$6,000-\$19,999 EFC	EFC	17%	\$6,000-\$19,999 EFC	
1%	\$20,000+ EFC	EFC	1%	\$20,000+ EFC	

a student works, their family position, and outside responsibilities required of them as well as the amount of time studying and their grit to succeed. Because of extraneous variables such as these that are not accounted for in this study, it is important to note that this is merely a

snapshot of several variables that do indeed predict on-time completion in a medium size, rural-serving community college in Iowa. The financial aid award can indeed help students complete on-time.

Summary

This chapter summarized the results of this study involving a specific institution in rural Iowa. First, descriptive results depicted the demographic characteristics of the cohort of students provided by the institution. Second, logistic regression was conducted and analyzed to determine whether models of independent variables could predict on-time completion. The next and final chapter will present and discuss the findings and conclude with implications for rural community colleges, and specifically this institution, related to practice and future research.

CHAPTER 5. DISCUSSION, IMPLICATIONS, AND CONCLUSIONS

Overview

The final chapter provides a brief summary of the study. Results were analyzed for the institution that provided the data; however, similar medium size rural-serving community colleges could find the results useful in future strategic planning. Practical implications for community college administrators and practitioners are presented. Recommendations for future research were based on the findings and research limitations.

Community college completion has been a topic of discussion and research for many years among educators and policymakers. Students who begin their college education at a community college usually enroll with many barriers facing them that can impede their credential completion. Community college students are usually older, first-generation students and students from underrepresented populations. Many come from low socioeconomic status and need remedial education to obtain a college-level reading, math, and writing. All of these characteristics are research proven to decrease the likelihood of completion. For many who have competing commitments such as jobs and families, enrolling part-time is how they manage and afford college. Enrolling part-time is also an obstacle to on-time completion.

An element of this study was to examine the demographic, academic, and financial characteristics of students who enrolled in a medium size, rural-serving community college in Iowa during the fall semesters of 2010, 2011, 2012 and 2013. This cohort was comprised of first-time-in-college students. A quantitative analysis was conducted utilizing descriptive and inferential statistics. With the dependent variable being whether a student completed a

credential in normal time to completion, or often described as on-time completion, a logistic regression analysis was deemed most appropriate since the outcome variable was dichotomous.

Results and Discussion

A review of the literature regarding completion at community colleges related to variables identified in the previous work of Tinto (1993) and Bean and Metzner (1985) assisted in the development of the research questions that guided this study. Research question one and five conducted a descriptive analysis and provided a contextual understanding of the data used in the study. Research questions two, three, and four utilized a logistic regression analysis, with the dependent variable being dichotomous. It analyzed student demographic information, academic characteristics, and financial characteristics to predict the probability that a student would complete a credential on-time.

The statistical analyses of the eleven independent variables were completed in three blocks of data (demographic, academic, and financial variables). The variables that were significant were underrepresented populations (RACE), specifically Black and Latinx students when compared to their White peers, dual enrollment (DUAL_ENROLL), math placement level (MATH_LEVEL), enrollment status (FIRST_TERM) and EFC category (EFC). The remaining variables that were not statistically significant were sex (SEX), the number of years between high school graduation and college enrollment (ENROLL_YRS), first-generation status (FIRST_GEN), housing (HOUSING), dependency status (DEPEND_STATUS) and FAFSA status (FIN_STATUS). Table 7 provides an overview of the variables found to be statistically significant.

The following information is presented in the categories of the independent variables: demographic, academic, and financial characteristics.

Demographic

Sex

There were slightly more males ($n = 1,640$) than females ($n = 1,414$) who comprised this first-time-in-college cohort. This is not typical of most community college enrollments, as females usually outnumber males (*Fast Facts - AACC*, 2017; St. Rose & Hill, 2013). Nationally, females have enrolled more than males in post-secondary education institutions since 1978 (Snyder, Tan, & Hoffman, 2003).

In Iowa, females accounted for 54 percent of the students enrolled in community colleges and have since the state-wide management information system was put in place in fiscal year 1999 (*The Annual Condition of Iowa's Community Colleges*, 2017). Conger and Long (2010) and Corbett, Hill & St. Rose (2008) found that females not only enroll at higher rates than males, but they complete at higher rates. When reviewing on-time completion for this study, males and females were very similar in that 27 percent of males and 26 percent of females completed on-time. The logistic regression for sex was analyzed and no difference was detected for males and females completing on-time.

Years to College Enrollment

The students were primarily traditional in age, meaning that they enrolled immediately following high school ($n = 2,410$). On-time completion for traditional students was the highest with 30 percent completing on-time. The population of Iowa community college students under 25 years of age is almost 80 percent, with a median age of 20 (*The Annual Condition of Iowa's Community Colleges*, 2017). Two thousand seven hundred

sixty-five (2,765) students, or 91 percent of this student cohort, was under the age of 25, and the median age was 18 ($n = 2,013$).

Completion rates were similar for students who took several years off between high school and college ($n = 233$) and those who waited more than five years after high school to enroll in college ($n = 223$). However, on-time completion was low for both groups in that just 15 percent of students who waited a year or more to enroll completed on-time. The remaining 188 students in the cohort were students who earned a GED. Of the students who earned a GED, only nine percent completed on-time.

These findings align with the work of Shapiro et al. (2016), which found that age does matter when it comes to earning a college credential. While this variable is measuring years from high school to college enrollment, it mimics age of enrollment. Bean and Metzner's (1985) student attrition model assumes older students will have more family obligations, hours of employment and higher levels of absenteeism than younger students. Mainly things that are an indirect effect of age while enrolled in college.

Even though the variable detected no difference in delayed enrollment to college when compared to traditional students and we fail to reject the null hypothesis, community college administrators can benefit from knowing information about this variable and on-time completions. Notably, the college should review the support systems in place for students who obtain a GED, regardless of age or when it was completed. In this study, GED graduates had one of the lowest completion rates at only nine percent.

Underrepresented Students

Students who identified as belonging to an underrepresented population made up 13 percent of the cohort, with Black students ($n = 197$) being the largest underrepresented population and Latinx students ($n = 144$) being second. Due to low numbers in all other

Table 7.

Variables and Significance

Variables	Logistic Regression Analysis Results
Demographic	
Sex (SEX)	Not Significant
Underrepresented Students (RACE)	
Black	Significant
Latinx	Significant
Other/Multi-racial	Not Significant
Years to College Enrollment (ENROLL_YRS)	
1-4 years after high school graduation	Significant
5+ years after high school graduation	Not Significant
GED graduates	Not Significant
First-Generation Students (FIRST_GEN)	Not Significant
Academic	
Dual Enrollment (DUAL_ENROLL)	Significant
Math Placement Level (MATH_LEVEL)	Significant
Housing Arrangement (HOUSING)	Not Significant
Enrollment Status (FIRST_TERM)	Significant
Financial	
Estimated Family Contribution (EFC)	Significant
Dependency Status (DEPEND_STATUS)	Not Significant
FAFSA Status (FIN_STATUS)	Not Significant

categories, including multi-racial, they were categorized together ($n = 65$). Hence, the majority of students identified as White ($n = 2,648$), which is the general ethnicity and race demographic in this rural community college region. Having 13 percent of this cohort identify as an underrepresented population is below the state proportion of 21 percent (*The Annual Condition of Iowa's Community Colleges*, 2017) and the national average (35 percent).

The on-time completion of Black and Latinx students was well below the on-time completion of White students. For this cohort, seven percent of Black students and 13 percent of Latinx students completed on-time versus 26 percent of other/multi-race and 29 percent of White students. Underrepresented populations—specifically, the Latinx population, people of Hispanic and Latino origin—now make up the state of Iowa’s largest race or ethnic minority group (*Latinos in Iowa: 2018*, 2018).

Underrepresented populations in this study fall far below the national average of completion with 26 percent of Black students completing and 33 percent of Latinx students (Shapiro et al., 2014). The findings of this logistic regression analysis indicate that when Black and Latinx students are compared to their White peers, they were significantly lower with on-time completion; therefore, we reject the null hypothesis and accept the alternative hypothesis that there is a difference between Black and Latinx student on-time completion when compared to White students.

Community college administrators must be aware of these differences, especially the Black and Latinx student populations’ on-time completion rates. A top priority of community college leaders and practitioners should be to develop strategies for underrepresented student success that align with the Future Ready Iowa’s initiatives (“Future Ready Iowa Alliance Recommendations,” n.d.) to decrease the disparity in educational attainment by race and ethnicity.

First-Generation Students

This cohort was found to be 68 percent first-generation students, substantially higher than the national average of 33 percent (*Fast Facts—AACCC*, 2017). Overall nationally, the percentage of first-generation students has declined over the past decade. Thirty-seven

percent were considered first-generation in 1999–2000 (Skomsvold, 2015). This college has consistently enrolled over 60 percent of first-generation students (*Enrollment trends & analysis*, 2017).

As expected, continuing-generation students ($n = 839$) completed on-time 33 percent of the time versus 25 percent of first-generation students ($n = 2,081$). This corresponds to the research that indicates first-generation students complete at a rate less than students who have parents who have obtained a bachelor's degree (Redford et al., 2017).

The logistic regression analysis found that when controlling for all other variables, no difference was detected in on-time completion for first-generation students and continuing-generation students, therefore, we fail to reject the null hypothesis. This may be due to the college having a federally funded Trio program, Student Support Services, which works specifically with students who are first-generation students, low income or students with disabilities. They provide additional resources such as counseling, tutoring, survival skills, orientation classes, career exploration, transfer assistance, and cultural awareness. These services are provided to 200 students annually. As Bean and Metzner's (1985) non-traditional student attrition model suggests, non-traditional students experience an environmental pressure that includes more interaction with the external environment and less with internal environments. This program specifically targets those students who need additional resources to be successful and exposes them to internal environments more frequently and provides a pathway to their success.

Academic

Dual Enrollment

Students who earn college credits while in high school are more likely to complete on-time than students who do not earn dual credits (Struhl & Vargas, 2012). This college has

experienced a 565 percent increase in dual enrollments since 1995. In fall 2018, dual-enrolled students accounted for 39 percent of the total population of enrollment (*North Iowa Area Community College Enrollment Report*, 2018). Approximately one-third of this cohort earned college credits from NIACC while in high school. As earned credits increased, so did the percentage of students completing on-time, with 46 percent of students who earned 13–24 credits and 64 percent of students who earned more than 25 credits completing on-time. The null hypothesis for dual enrollment credits earned is rejected based on the logistic regression was significant ($p \leq .001$) – students who earned dual enrollment credits while in high school increase their odds of completing on-time by almost two times over the students who do not earn dual credits.

Given state and national goals of increased college completion and a more skilled labor force (“Complete College America,” 2017; “Future Ready Iowa,” n.d.), community college administrators ought to work with local industry and economic development organizations to ensure high school students are provided opportunities to earn college credits in high-demand jobs within their service district.

Math Placement Level

Nationally about 60 percent of all first-time-in-college students are required to enroll in developmental math (Bahr, 2009; Bailey et al., 2010; Wang et al., 2017). This cohort was slightly different with approximately 80 percent of the students placing at least one level below college math (Intermediate Algebra). Over half (55 percent) placed two levels below college math (Beginning Algebra), and 16 percent placed three levels below college algebra (Pre-Algebra).

The level of math placement supports on-time completion. The percent of on-time completion drops substantially when a student places two levels below college math ($n =$

1,687) with less than one-quarter of these lower-placing math students completing on-time. This supports Adelman's (2006) research that the level of academic preparation for college is a significant predictor of credential completion and success of the student.

Of the cohort, 19 percent placed at college level math ($n = 591$) and required no math remediation. However, despite being college ready, fewer than half (46 percent) completed on-time. The logistic regression conducted was found to be significant ($p < .001$), therefore, we reject the null hypothesis and find that for students who place every level below college math, their likelihood of completing on-time decreases by 0.714.

Iowa led the nation in eighth grade math scores in the 1990s to now being stagnant with little improvement over the past two decades (*Metrics That Matter*, 2017). Developing ways to identify and help students struggling with math long before enrolling in college would impact the number of students who enroll in developmental courses that do not count for credit. Establishing ways to allow students to pass through developmental work more quickly is critical to meeting the state and national college completion goals.

Housing Arrangement

Over three-fourths of the students in this cohort lived off campus ($n = 2,390$), and of this group, 27 percent completed on-time versus 26 percent of students who resided in on-campus housing. While research studies show that students' living on campus increases the probability of their graduating (Moeck et al., 2007; Pascarella & Terenzini, 2005), this study found just the opposite, with both off-campus and on-campus students' on-time completion rates being very similar. This rural-serving community college provides students with on-campus housing, an amenity provided by only 25 percent of community colleges nationwide (*Fast Facts - AACC*, 2017).

There was insufficient evidence to reject the null hypothesis and conclude there was no difference between students living off-campus versus on-campus and on-time completion. Research suggests that living on-campus increases the likelihood of completing a credential; this was not the case for this study. However, with a new housing facility, it would be beneficial for this community college to explore establishing an advising center in the buildings where students reside, allowing them the opportunity to meet with advisers outside of normal work hours. These outside of work hours with college staff could influence a student's attitude about education and as Bean and Metzner's student attrition model suggests increase their decision to stay enrolled in college.

Enrollment Status

First-term enrollments were predominantly full-time, with 2,536 students (80 percent) enrolled in more than 12 credit hours. Iowa community college students tend to enroll part-time more often with only 37 percent enrolling full-time (*Fall Enrollment Report 2017*, 2017)—very similar to the national average of 38 percent (*Fast Facts - AACC*, 2017).

The part-time students in this cohort had a very low percentage of on-time completion with only four percent of the 518 students completing. This result aligns with Driscoll's (2007) findings that enrolling part-time the first semester correlates to not completing a degree. Fike & Fike (2008) posited that part-time students are more likely to stop out at some point for a semester or two, which decreases their chances even further of not only on-time completion but completion overall. The logistic regression was found to be significant ($p \leq .001$), therefore, we reject the null hypothesis and conclude that with a 95 percent confidence level that full-time are more likely to complete on-time than part-time students. Enrollment status was a significant predictor of on-time completion where enrolling full-time

the first term results in a student completing nearly eight times more than students who enroll part-time. The number of students who are first-time-in-college and enrolling part-time at this college may be a small group but developing strategies to aid in students' completion will provide a positive return for the college and ultimately, the economy and its workforce.

Financial

Estimated Family Contribution

In this study, Estimated Family Contribution (EFC), as identified by the Free Application for Federal Student Aid (FAFSA), is used as an indicator of socioeconomic status. Davidson (2015) finds that EFC is a more accurate way of measuring socioeconomic status (SES) with completion versus whether or not a student receives a Pell grant. Many factors play into a student getting a Pell grant; whereas, the EFC is generated from tax and financial information provided on the FAFSA.

When using EFC as an indicator of SES, students with the lowest EFC (zero) are considered the neediest because the financial situation shows that they are not able to contribute any dollar amount towards their education. These students receive the most aid to offset the cost of educational expenses. As Kantrowitz (2009a) discovered, this study found that students with the lowest EFC also had the lowest on-time completion with only 14 percent completing. As the EFC rises, the on-time completion percentage increases until the \$20,000 level or more that a family can contribute, and then it declines slightly.

While 15 percent of this cohort did not complete the FAFSA, 27 percent had an EFC between 1 and 5,999, which somewhat correlates to Pell grant standards. The logistic regression analysis was statistically significant ($p \leq .001$) with an odds ratio of 1.355, therefore, we reject the null hypothesis and accept the alternative hypothesis that as the EFC range increases, the likelihood of completing on-time also does. This data will provide a

reliable benchmark of success for students with low EFCs at this college. In fall 2018, the college launched the first-in-the-state Promise Scholarship program for traditional-age students with an EFC between 0 and 7,000. The last dollar scholarship provides students from within the district a scholarship for any tuition and required fees that are not covered by federal and state financial aid and the college's foundation scholarships. As long as a student maintains a 2.0 grade point average, it is renewable for a second year.

Dependency Status

The majority of students in this study were classified as dependent students, which requires them to provide parent tax and financial information as well as their own. The national trend is the opposite, in which more than half of all United States college students are independent students (Reichlin Cruse et al., 2018). Of the 2,588 students who submitted a FAFSA, only 16 percent were classified as independent ($n = 413$).

Of this group (independent student status), 15 percent completed on-time. The logistic regression was not significant in which we fail to reject the null hypothesis and find there is not enough evidence is available to suggest that dependency status predicts on-time completion. This contradicts deBoef (2018) findings that dependent students are more likely to complete a degree than independent students. For independent students, the very things that cause them to be classified as independent, e.g., over the age of 24, married, and/or have a legal dependent, may impact their completion. It is important to note that the timeframe of the data used in this study was immediately following the Great Recession in which many independent students had lost jobs during the recession. This may have afforded them additional resources to help them earn a credential. Several companies that laid off employees qualified for Trade Act programs which are federal programs that provides aid to workers who lose their jobs as a result of the work going overseas.

In time, it would be beneficial to evaluate the barriers that independent students are facing and investigate ways to provide services to bolster the success of the ones who do not complete. Community college leaders at this institution may find that offering a scholarship similar to the Promise Scholarship would benefit this group of students who tend to have more than one barrier to their college credential success. Iowa will need approximately 885,000 working age people educated beyond high school by 2025 in order to meet the 70 percent education attainment goal established by the Governor (*Metrics That Matter*, 2017). This population could be the best option for actually fulfilling that goal if the appropriate services and resources are provided to them to complete their education or training.

FAFSA Status

A large portion of this cohort completed the FAFSA and received financial aid. Of the 2,444 students (80 percent) who received a financial aid award, only 27 percent completed on-time. For students who did not receive a financial aid award, the findings were similar with 24 percent completing on-time. Overall, only about a quarter of students complete on-time, whether or not they receive financial aid. The logistic regression analysis did not prove to be significant for completing the FAFSA and receiving an award thus we fail to reject the null hypothesis with 95 percent confidence level and conclude that FAFSA status is not a significant predictor of on-time completion.

Although test results were not significant, and there was only 20 percent of the students who did not complete the FAFSA, it would benefit the college to assess these students to find out how many of them may have qualified for financial aid if they had only applied. As Kantrowitz (2009a) found, over one billion dollars every year is not used by those who would have been eligible. If we are to train and educate Iowan's for higher skilled jobs of the future, every avenue must be explored to aid in credential completion.

In summary, it was the academic variables used in this study that had the highest correlation with on-time completions, with students who earned more than 13 dual-enrollment credits and students who placed at higher-level math being the most likely to complete on-time. GED graduates, part-time students, and Black students were the lowest for completing on-time. Many variables align with current research provided in the literature review, but the variables in this study that contradict previous research were female students, on-campus housing students, and dependent students. Further investigation of these variables could provide a better picture of why there is a difference from what previous studies and literature have found.

Limitations

A quantitative analysis was conducted at this medium size, rural-serving community college in Iowa to understand better the demographic, academic, and financial characteristics of first-time-in-college students and their likelihood of completing on-time. There were several limitations to this study; the first one being that most of the demographic variables were self-reported. The variables provided a snapshot of a student's demographic, academic, and financial characteristics. They were used to assess on-time completion either one or two years later based on the student's program of study. It could be likely that some of the variables changed throughout the normal time to completion.

Second, some variables required recoding based on statistical errors with the data. For example, age was recoded to years between high school and college enrollment with three categories of years for high school graduates and one category for GED graduates. Other variables were recoded due to small cell sizes.

Third, this survey only included one community college's data. The specific data may be generalizable to small and medium size, rural-serving community colleges in the

Midwest, but caution must be made when generalizing this information to other parts of the country due to the years selected for this cohort. The years of enrollment were just after the Great Recession and different areas of the country experienced different ramifications from this economic downturn.

Fourth, the timing and structure changes that took place during the time frame studied could have had an impact on some results. This data was collected starting the fall term of 2010 when the unemployment rate was 5.9 percent. The economy and workforce needs impact community college priorities and decision making. Add to that the fact of senior leadership changes also may have changed priorities and decision making. In the time frame of the study, there were three different Presidents (one of which was interim), there were three Vice Presidents of Academic Affairs (one of which was interim) and two Vice Presidents of Student Services.

Implications for Policy and Practice

The findings of this study offer a foundation to provide implications to community college administrators, policymakers, and practitioners like community college academic advisors, high school counselors, and department chairs. These findings are significant to community colleges, but in particular to ones that are rural-serving and located in the Midwest. As institutions seek to increase enrollment, persistence, and completion rates, having a better understanding of students' demographic, academic, and financial characteristics can serve as baseline data for future research and provide insight for improving on-time completion.

The results of this study can provide information regarding differences between students who complete on-time versus those who do not. Most research and measurements of success utilize a longer-than-normal time to completion. For example, the U.S.

Department of Education utilizes a measurement of success by a student completing within 150 percent of normal time to completion. The National Student Clearinghouse measures success in 300 percent of normal program completion. Graduation rates date back to the 1980s when Senator Bill Bradley introduced legislation requiring colleges to report graduation rates. The legislation was limited to measuring first-time-in-college students who enrolled full-time the fall semester of any higher education institution. The main issue with this measure is that it does not fit a community college student well; they may begin their enrollment in the spring or summer term, they may not be a first-time student, they may enroll part-time, and they do not plan to earn a credential at the community college (Juszkiewicz, 2015).

While this measurement is still being used today, the U.S. Department of Education in 2017 released a revised measurement for graduation that includes part-time enrolled students and returning students in the calculations. They extended the time frame for completion to eight years and made separate calculations for measuring the students who transferred before graduation and were still in college at a different institution. It would benefit community college administrators to utilize multiple measurements of success to get an accurate picture of their entire student population success.

With the understanding that this study utilized on-time completion, current practices and resources should not only be examined by administrators and policymakers but by the practitioners who directly work with students. Admissions counselors, academic advisors, high school counselors, and department chairs should be reviewing current practices that aid in student completion. Specifically, for NIACC, this could lead to new advising practices for students who are likely to not complete on-time, i.e., Black and Latinx students, students who

do not earn dual enrollment credits while in high school, students who score low on math placement assessments, part-time students and students who have a low socioeconomic status.

While many colleges, including the one in this study, have multiple terms in addition to fall and spring, advising students and providing a clear pathway for completion utilizing these additional terms would allow students to complete on-time. If a student chooses to enroll part-time, there should be a plan to completion no matter how long it may take them. For department chairs, it would be beneficial to review course offerings for each of the additional terms to ensure that courses offered are the ones students need in order to complete on-time despite their enrollment status of full-time or part-time. Also, academic advisors should be informing students of the higher likelihood of completing by enrolling in just one semester full-time. Providing a clear pathway may be the difference between a student completing or dropping out.

In addition to ensuring courses are offered to complete in a timely manner, it would be beneficial to explore any programs that may need restructuring to meet the needs of the students. Typical courses offered between eight o'clock and three o'clock during the week may not be meeting the needs of the students who are employed. With over half of the students in this study classified as a low or very low socioeconomic status, these students may be working to provide for themselves and families while attending college. This brings forth another implication for the future success of students, financial resources. Providing additional aid to students would allow them to work less and focus more on their coursework. When community colleges offer scholarships to students, identifying their demographic and financial characteristics would highlight the most at-risk students could be in danger of not

completing. Providing the lifeline of a scholarship would allow students the financial benefit and increase their likelihood of completing. By strategically utilizing scholarship dollars, both the college and the foundation would see higher rates of return on their investment.

Another approach to advising students is to work with the dual-enrolled students to ensure the coursework they are taking while in high school will work toward their degree or credential after graduation. Too many students take courses that may not work into their program of study once they graduate and by providing academic advising to them while still in high school can decrease their time to completion; essentially ensuring they are enrolled in the right courses for their college major. Also increasing the number of college credits earned while in high school increases the likelihood of on-time completion, promoting not only college success but future economic success and job stability. Community colleges have always worked with local employers to meet the economic needs of the service area. By aligning dual-enrolled coursework, administrators ought to work together with local businesses to establish programs and curriculum that meet the needs of dual-enrolled high-school students and their school districts. Aligning dual-enrolled student coursework, job shadowing, and internship programs will aid in addressing the skills gap by educating and training younger students sooner.

Administrators and department chairs of community colleges will need to investigate further ways to accelerate developmental math sequences. With the likelihood of not completing on-time very low with each level a student scores below college math, new practices and policies are essential to the future success of these students. This data can provide a useful benchmark of previous practices where students were required to enroll and

successfully complete each developmental math course in sequential order to access college-level math, which many times is required in a program of study.

An implication for practitioners would be to work with the high schools in the area served by the community college and allow every sophomore to take an assessment measuring their current math, reading and writing levels. Allowing community college academic advisors and high school counselors to work with students on the expectation of math level for different career choices could change the trajectory of the student's math competencies before enrolling in college.

In order to move the mark on college completion in the state of Iowa and across the nation, it is imperative that community colleges continue to provide quality education at an affordable price and serve the needs of the people and employers in its service areas. Community colleges are the workhorses of the local economy; they educate and train individuals to fill the skills gap identified by government leaders. With over 60 percent of jobs in the future requiring education beyond high school, knowing the students who enroll and providing them with top-quality training and services will help achieve these state and national initiatives.

Future Research

This study examined the demographic, academic, and financial characteristics of a cohort of first-time-in-college students in a medium size, rural-serving community college in Iowa and analyzed their likelihood of completing on-time. Researchers could replicate this study at any college of any size. Similarities and differences could be measured between the different types of institutions.

Second, interactions could be applied to the demographic, academic, and financial variables to probe more deeply into characteristics of students who do or do not complete on-

time. This project reported variables separately only to provide a solid foundation for understanding the students enrolled and their characteristics that led to on-time completion. Additional variables would provide a richer data set of student tendencies toward completion. However, as found when obtaining the data set, institutional data can be difficult to obtain from college's management information systems. Making sure the data is clean and accurate can be challenging.

Third, this study could be replicated and completion evaluated based on a longer time frame to completion, such as 150 percent and 300 percent, as many other studies have used. Due to the many barriers community college students face, it would be beneficial to know if students stopped out and eventually completed or if they stopped out and never returned.

Fourth, variables that were found to be not statistically significant could be further researched to determine completion in a different way. For example, years from high school graduation to college enrollment was not significant in this study, but research suggests that age does matter when it comes to completion. It could be that this variable is significant when other variables are present in another study.

Last, this study provided quantitative results of on-time completion. A qualitative study may provide insight to accompany the data and a richer understanding of why students do not complete on-time. This data could provide college administrators with anecdotal information that cannot be found through quantitative analysis.

Conclusion

This study focused on understanding first-time-in-college students enrolled at this rural Iowa community college and the likelihood of their completing on-time. The study utilized Bean and Metzner's (1985) non-traditional student attrition model as the lens for developing the research questions and analysis of on-time completion. The study

accomplished the research goals by identifying the demographic, academic, and financial characteristics of the cohort of students and the predictors of their on-time completion success.

Findings from this study of on-time completion can be used to facilitate progress towards the National Complete College Agenda and the state of Iowa's Future Ready Iowa program for post-secondary education. *The Annual Condition of Iowa's Community Colleges* (2017) report sums up the reason why this research is important:

“Every hard-working student, no matter what his or her socioeconomic status or background, deserves an opportunity to acquire the high-quality degrees and industry-recognized credentials offered at Iowa's 15 community colleges that provide a clear path to financial security. The personal opportunity also enhances Iowa's economic growth and global competitiveness” (page 77, para 4).

Integrating policies and practices to meet the diverse needs of rural Iowa community college students will enhance credential completion for future higher-skilled jobs. With the projection that 68 percent of future jobs will require an education beyond high school, this information will help move the marker on the number of people who have an education beyond high school and help to achieve the national and state goals for college completion.

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APPENDIX A. LITERATURE MAP

STUDENT DEMOGRAPHICS

Biological Sex

Buchmann & DiPrete, 2006
 Conger & Long, 2010
 Corbett, Hall & St. Rose, 2008
 Lopez, 2014
 Pollard, 2011
 St. Rose & Hill, 2013
 Turk, 2017

Age at College Enrollment

Choy & Phillips, 2002
 Craig & Ward, 2008
 Petty, 2014
 Shapiro, Dundar, Wakhungu, Yuan & Hwang, 2016
 Stratton, O'Toole, & Wetzel, 2006
 Taniguchi & Kaufman, 2005

Underrepresented populations

Calcagno Crosta, Bailey & Jenkins, 2007
 Greene, Marti, McClenney, & Kay McClenney, 2008
 Mangan, 2014
 Perna, 2007
 Shapiro et al., 2017
 Strayhorn & Johnson, 2014
 Wood, 2012

First-Generation Students

Alexander, Entwisle, & Bedinger, 1994
 Atherton, 2014
 Byrd & MacDonald, 2005
 Choy & Phillips, 2002
 Davis-Kean, 2005
 Engle and Tinto, 2008
 Nuñez, Cuccaro-Alamin, & Carroll, 1998
 Petty, 2014
 Redford, Mulvaney Hoyer, & Ralph, 2017

ACADEMIC CHARACTERISTICS

First Term Enrollment

Driscoll, 2007

Fike & Fike, 2008

Moms, 2012

Dual Enrollment

Grubb, Scott, & Good, 2017

James, Lefkowitz Laura, & Hoffman, 2017

Karp, Calcagno, Hughes, Jeong, & Bailey, 2008

Struhl and Vargas, 2012

Thomas, Marken, Gray, Westat, & Ralph, 2013

Zinth, 2014

Development Education – Math

Adelman, 2006

Baber, Castro, and Bragg, 2010

Bahr, 2013

Bailey, Jeong & Cho, 2010

Calcagno, Crosta, Bailey & Jenkins, 2007

Fike & Fike, 2008

Fong, Melguizo & Prather, 2015

Grimes & David, 1999

Park, Woods, Hu, Jones, & Tandberg, 2018

Wang, Wang, Bailey, Jeong, Cho, & Bailey, 2008

Housing Arrangement

Moeck, Hardy, & Katsinas, 2007

Moeck, Katsinas, Hardy, & Bush, 2008

Pascarella & Terenzini, 2005

FINANCIAL CHARACTERISTICS

FAFSA & EFC

Davidson, 2015

Kantrowitz, 2009

McKinney & Roberts, 2012

Novak & McKinney, 2011

Dependency Status

deBoef, 2018

Reichlin Cruse, Eckerson, & Gault, 2018

FAFSA Status

Cochrane, LaManque, & Szabo-Kubitz, 2010

Cohen & Brawer, 2008

Evans, Nguyen, Tener, & Thomas, 2017

Long & Riley, 2007

Kantrowitz, 2009

McKinney & Roberts, 2012

Novak & McKinney, 2011

Kezar, 2010

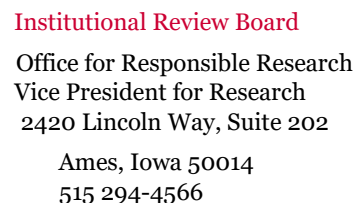
Perna & Thomas, 2008

ON-TIME COMPLETION

Bailey & Cho, 2010

Juszkiewicz, 2015

Shapiro, Dundar, Wakhungu, Yuan & Hwang, 2016



The project referenced above has been declared exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b) because it meets the following federal requirements for exemption:

4: Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, (i) if these sources are publicly available, or (ii) if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or indirectly through identifiers linked to the subjects.

The determination of exemption means that:

- **You do not need to submit an application for annual continuing review.**
- **You must carry out the research as described in the IRB application.** Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any *modifications to the research procedures* (e.g., method of data collection, nature or scope of information to be collected, changes in confidentiality measures, etc.), modifications that result in the *inclusion of participants from vulnerable populations*, and/or any *change that may increase the risk or discomfort to participants*. The purpose of review is to determine if the project still meets the federal criteria for exemption.

In addition, *changes to key personnel* must receive prior approval.

Detailed information about requirements for submission of modifications can be found on our website. For modifications that require prior approval, an amendment to the most recent IRB application must be submitted in IRBManager. A determination of exemption or approval from the IRB must be granted before implementing the proposed changes.

Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

Please note that you must submit all research involving human participants for review. **Only the IRB or its designees may make the determination of exemption**, even if you conduct a study in the future that is exactly like this study.

Please be aware that **approval from other entities may also be needed**. For example, access to data from private records (e.g., student, medical, or employment records, etc.) that are protected by FERPA, HIPAA or other confidentiality policies requires permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required by their policies. **An IRB determination of exemption in no way implies or guarantees that permission from these other entities will be granted.**

Please be advised that your research study may be subject to post-approval monitoring **by Iowa State University's Office for Responsible Research**. In some cases, it may also be subject to formal audit or inspection by federal agencies and study sponsors.

Please don't hesitate to contact us if you have questions or concerns at 515-294-4566 or IRB@iastate.edu.